BULLETIN

DE LA

SOCIÉTÉ ENTOMOLOGIQUE

D'ÉGYPTE

TREIZIÈME ANNÉE

1920

BULLETIN

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SOCIÉTÉ ENTOMOLOGIQUE

D'ÉGYPTE

FONDÉE LE 1er AOUT 1907

Fatti non foste a viver come bruti,
Ma per seguir virtude e conoscenza
DANTE

Sa Hautesse le Sultan Fouad Ier a daigné prendre la Société sous son Haut Patronage

Année 1920

LE CAIRE
IMPRIMERIE PAUL BARBEY
1921

I. B.
E.

BULLETIN

DE LA

SOCIÉTÉ ENTOMOLOGIQUE D'EGYPTE

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Membres Honoraires

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» Fauvel (Albert), 3, rue Choron, Caën (Calvados), France.

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1908 Simon (Eugène), 16, Villa Saïd (70, rue Pergolèse), Paris (16e).

1920 TONNOIR (André), Museum d'Histoire Naturelle, 31, rue Vautier, Bruxelles, Belgique.

» VILLENEUVE (Dr Joseph), Rue des Vignes, Rambouillet (Seine et Oise), France.

Membres Titulaires

1911 MM. ABAZA Bey (S.E. Abdel Hamid), Boîte Postale N° 63, au Caire.

1913 ABAZA (S.E. Fouad Bey), Boîte Postale N° 63, au Caire.

1908 ADAIR (Ernest W.), Turf Club, au Caire.

1909 ALFIERI (Anastase), Société Sultanienne d'Agriculture, Boîte Postale N° 63, au Caire.

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1916 BAHGAT (Saïd), Boîte Postale N° 63, au Caire.

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1917 ERIAN (Boutros Bassili), Sous-Inspecteur au Ministère d'Agriculture, Dessouk, Basse-Egypte.

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F INNES Bey (Dr Walter), Square Halim, Esbékieh, au Caire.

1917 INTERDONATO (Ricardo), Banco di Roma, à Alexandrie.

1915 JULLIEN (Joseph), Compagnie du Canal de Suez, Kasr-el-Doubara, au Caire.

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1919 MOCHI (Dr Alberto), 119, Sharia Abbas, au Caire.

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1908 NUBAR Pacha (S.E. Boghos), Daïra Nubar Pacha, Héliopolis, près le Caire.

1910 PACHUNDAKI (D.), Directeur de l'Institut Sultanien d'Hydrobiologie, Chatby, à Alexandrie.

1918	Peter (Francis), Juge au Tribunaux Mixtes, au Caire.
1911	Petroff (Alexandre), Consul de Russie, Boulevard Ramleh, à Alexandrie.
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1909	Todd (Dr C.), Turf Club, au Caire.
1920	Vogel (Waldemar), Boîte Postale N° 475, à Alexandrie.
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1912	Wilkinson (Richard), Banque Nationale, au Caire.
1918	Wlandi (Charles), Avocat, Boîte Postale N° 380, au Caire.
1915	Zoological Service, Ghizeh, près le Caire.

Abonnés

The Imperial Entomologist, Agricultural Research Institute, Pusa (Bihar), India.

The Treasurer, Dept. of Agriculture, Nairobi, British East Africa.

Société Sultanienne d'Agriculture, Bibliothèque Section Technique, B.P. 63, au Caire.

The Director of Agriculture, Baghdad, Mesopotamia.

Liste des Sociétés qui ont accepté l'échange des Publications

Algérie.— Société d'Histoire Naturelle de l'Afrique du Nord, Faculté des Sciences d'Alger, Alger.

Allemagne.— Deutshes Entomologisches Museum, Gossler-str. 20, Berlin, Dahlem.

Angleterre.— Imperial Bureau of Entomology, Review of Applied Entomology, 41, Queen's Gate, London S. W. 7.

Novitates Zoologicae, Tring Park, Tring Herts.

Australie. — The Entomologist's Office, Department of Agriculture, Sydney, N.S.W.

Belgique. — Société Entomologique de Belgique, 89, Rue de Namur, Bruxelles.

Brésil. — Museu National do Rio de Janeiro, Rio do Janeiro.

Canada.— Entomological Society of Ontario, Ontario.

International Institute of Agriculture, Commissioner's Office, Department of Agriculture, Ottawa.

Chili.— Museo de Historia Natural y Etnografia, Conception.

Danemark.— Entomologisk Forening, Zoologisk Museum, Krystalgade, Copenhague.

Egypte.—Ministère d'Agriculture, Bibliothèque, au Caire.

Espagne. — Instituto Generale y Técnico de Valencia, Laboratorio de Hidrobiologia Espanola, Valencia.

Junta para ampliacion di Estudios, Almagro 26, Madrid.

Junta de Ciencies Naturales de Barcelona, Museo Municipal, Barcelona.

"Physis" Publicacio destinada als amics de la Naturalesa, Apartado 654, Barcelona.

Real Academia de Ciencias y Artes de Barcelona, Barcelona.

Real Sociedad Espanola de Historia Naturale, 74, Alphonso XII, Madrid.

Etats-Unis. — Buffalo Society of Natural Sciences, Buffalo.

Library of the American Museum of Natural History, Central Park, 77th Street, 8th Avenue, New-York.

New-York Entomological Society, Eastern Parkway, Brooklyn, New-York.

Academy of Natural Sciences, Entomological Section, Lagon Square, Philadelphia.

American Entomological Society, Lagon Square, Philadelphia.

United States Department of Agriculture, Washington, D.C.

United States National Museum, Smithsonian Institution, Washington, D.C.

Smithsonian Institution, Washington, D.C.

Graduate School of Tropical Agriculture and Citrus Experiment Station, Riverside, California.

France. — L'Echange, Digoin (Saône et Loire).

La Revue d'Entomologie, 3, Rue Choron, Caen (Calvados).

La Revue Scientifique du Bourbonnais et du Centre de la France, Moullins (Allier).

Société d'Etude des Sciences Naturelles, 6, Quai de la Fontaine, Nîmes.

Société Linnéenne de Bordeaux, Athènée, 53, Rue des Trois Conils, Bordeaux.

Société des Sciences Naturelles de l'Ouest de la France, Nantes (Loire inférieure).

Société Entomologique de France, Hôtel des Sociétés Savantes, 28, Rue Serpente, Paris.

Société d'Etudes Scientifiques de l'Aube, Carcassonne (Aube).

Georgie.—Bureau d'Entomologie et de Phytopathologie Agricoles, Ministère de l'Agriculture de la République Georgienne, Tiflis (Transcaucasie).

Hongrie.—Musei Nationalis Hungarici, Magyar Nemzeti Museum, Budapest 80.

Indes. — Zoological Survey of India, Indian Museum, Calcutta.

Italie.—Museo Civico di Storia Naturale, Genova.

Societa dei Naturalisti, 48, S. Sebastiano, Napoli.

Accademia Scientifica Veneto Trentino Istriana, Padova (Veneto).

La Reale Stazione di Entomologia Agraria, 19, Via Romana, Firenze.

Laboratorio di Zoologia Generale e Agraria, Napoli (Portici).

Bibliothèque de l'Institut International d'Agriculture, Villa Umberto I, Rome.

Società Italiana di Scienze Naturali, Palazzo del Museo Civico, Corso Venezia, Milano.

Mozambique.—Reperticao de Agricultura de Provincia di Mocambiqua, Laurenzo Marques.

Portugal.—Société Portugaise des Sciences Naturelles, 144, Rue Santa Martha, Lisbonne.

Russie.—Société Entomologique de Russie, Moïka 96, Palais du Ministère d'Agriculture, Petrograde.

Revue Russe d'Entomologie, Uspenskij N° 3, Petrograde.

Suède.—K. Swenska Vetenskapsakademien i Stockholm, Stockholm.

Entomologiska Foreningen, Brottninggatten 94, Stockholm.

Kgl. Vetensk. och Witterh. Samhalle, Goteborg.

Suisse.— Schweizerische Entomologische Gesellschaft, Bern.

Zentralbibliotek, Naturforschende Gesellschaft, Zurich.

Internationaler Entomologenverein (Societas entomologica), Zurich.

N.B.—Pour changement d'adresse, erreur ou omission, s'adresser à M. le Secrétaire Général, Boîte Postale N° 430, au Caire.

Séance du 17 Mars 1920

Présidence de M. le Dr Bronislaw Dębski

Don :

Madame D. Limongelli, née Artin Pacha, fait don d'un grand portrait, encadré, de Son Excellence Yacoub Artin Pacha, ancien Président de la Société.

Communications

Note sur la dernière invasion de *Periplaneta americana* L. (Orthop.)

par Anastase Alfieri

L'objet de cette note est surtout de prendre date de la dernière invasion de *Periplaneta americana* L., qui a été signalée pendant l'été de l'année 1919. L'abondance extraordinaire de ces blattiens était sans nul doute dûe à l'accumulation des grands stocks alimentaires de l'armée, qui leur ont fourni les conditions les plus favorable à leur développement.

Provenant des dépôts, magasins ou sous-sols, les *Periplaneta*, soit à l'état larvaire ou adulte, s'introduisaient dans les habitations, surtout pendant la nuit, par les portes et fenêtres laissées ouvertes à cette

époque chaude de l'année, rendant ainsi en partie inefficaces les mesures prises pour s'en débarasser.

En tuant les larves et les adultes, en replâtrant les trous susceptibles de les héberger, en détruisant leurs oothèques, les jours suivants les *Periplaneta* étaient aussi abondants.

Cependant il semble que l'emploi du Borax est de grande utilité : « Le Borax est une insecticide qui devrait se trouver dans chaque maison ; déposé dans les coins, il éloigne les cancrelats ; mélangé d'un peu de sirop épais et étendu sur des plaques de fer blanc c'est un poison mortel pour les cancrelats s'il est placé sous les armoires ou autres endroits similaires ou les cancrelats cantonnent » (1).

Sur un *Trachys* d'Egypte (Col.)

par Anastase Alfieri

En août 1913, nos collections se sont enrichies d'une espèce de *Trachys* découvert à Massara, à l'ouest de la voie ferrée. C'est à fleur de terre, sous les feuilles de l'*Erodium glaucophyllum*, qu'il faut le chercher, et il n'est pas rare.

Ce *Trachys* est d'autant plus intéressant qu'il établit tout à fait la transition entre les *Trachys* vrais et le genre *Habroloma* Thomson, la carène posthumérale (caractère des *Habroloma*) étant, chez l'espèce égyptienne,

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(1) *Loc. cit.* : H. Maxwell Lefroy, Insecticides, Bull. N° 23, 1911, pp. 11-12, Agricultural Research Institute, Pusa, India.

presque rudimentaire ; à part cela, l'espèce est encore bien caractérisée par l'impression profonde des angles antérieurs du pronotum, par la forme du corps courte et convexe, la coloration et la pubescence générales.

Pendant que ma note était sous presse, Monsieur Maurice Pic, de Digoin, m'informe qu'il vient de décrire cette nouvelle espèce (L'Echange N° 403, p. 3, 1921) sous le nom de *Trachys* (*Habroloma*) *subalutacea* Pic.

Voici la diagnose qu'il donne de cette espèce: *Trachys* (*Habroloma*) *subalutacea* n.sp. —Subovatus, postice parum attenuatus, pro parte alutaceus, æneus, sparse griseo squamulatus, elytris vage griseo undulato-fasciatis. Long. 2 mill. Egypte (Reçu de Alfieri). — Ressemble à *Aurea* Sem., mais moins brillant, moins atténué postérieurement, épaules plus arrondies, etc.

Deux nouvelles Chironomides d'Egypte (Dipt.)

par J. J. Kieffer

Tanypus noctivagus Sp. nov. (1).

♂. — D'un roux carné ; balanciers d'un blanc de lait; antennes et pattes jaunâtres. Corps à peu près glabre. Yeux largement séparés au vertex. Article 2e des antennes deux fois aussi long que gros, les suivants globuleux, le dernier ovoïdal et grossi. Pronotum non lobé. Ailes velues, blanches, avec une large bande brune, transversale, graduellement amincie inférieurement, s'étendant depuis un peu en deçà de l'extrémité

(1) Memoirs of the Indian Museum, Vol II, N° 4, p. 222.

du radius jusqu'à celle du cubitus et aboutissant au bord postérieur sous le rameau inférieur de la posticale; les deux transversales et la base du cubitus sont noires, les autres nervures sont blanchâtres sauf les parties qui traversent la bande brune ; radius bifurqué à l'extrémité ; extrémité de la 2me longitudinale un peu plus distante de la pointe alaire que le rameau supérieur de la posticale ; cubitus arqué, dépassé notablement par la costale ; partie distale du pétiole de la posticale égalant presque le rameau inférieur ; tranversale ordinaire un peu oblique, aboutissant à la 2e transversale, qui est plus petite et perpendiculaire. Tibias antérieurs de moitié plus longs que le métarse, celui-ci égal aux trois articles suivants réunis ; tous les tibias sont plus courts que les tarses. Abdomen pas plus long que le thorax, ovoïdal et comprimé. Taille 2·3 mm.

Capturé le 9 Octobre, la nuit, sur le bateau, au Canal de Suez (N. Annandale).

Chironomus (*Prochironomus*) *tripartitus* Sp. nov. (1).

Femelle, mâle.—Thorax d'un roux brun, mat et glabre ; face blanchâtre ; antennes d'un brun noir, les trois premiers articles, les hanches, les pattes et la pince anale blanchâtres ; balanciers blancs ; parfois les 4 derniers articles des tarses antérieurs, les deux derniers des tarses intermédiaires et les trois derniers avec la moitié distale du 2e aux tarses postérieurs, assombris ; abdomen d'un gris brunâtre, bord postérieur des tergites plus clair. Yeux fortement arqués, faiblement amincis en haut, où ils sont distants de leur largeur. Antennes

(1) Memoirs of the Indian Museum, Vol II, N° 4, pp. 231-2.

de la femelle composés de 5 articles, dont le 2e est rétreci au milieu et deux fois aussi long que le 3e, les deux suivants en ovoïde court, avec un col plus court que la partie renflée ; le 5e en ovoïde court, avec un col aussi long que les articles 3 et 4 réunis, étroit et graduellement aminci. Le mâle a le panache d'un brun noir, les articles du flagellum transversaux, sauf le dernier qui est un peu plus long que les précédents réunis. Mesonotum à sutures latérales et suture médiane fortement marquées paraissant être traversé par trois arêtes. Ailes blanches, avec 8 taches enfumées, dont trois sont situées entre le cubitus et la discoïdale, la 1re sous l'origine du cubitus et dépassant un peu la discoïdale, la 2e sous le milieu du cubitus et la 3e sous l'extrémité du cubitus ; la 4e tache est située à l'extrêmité de la discoïdale, la 5e entre la discoïdale et le milieu du rameau supérieur de la posticale, la 6e dans la bifurcation de la posticale et se continue, en fine bande, le long du rameau inférieur jusqu'au bord alaire, qu'elle longe sur un court espace proximalement ; la 7e et 8e sont également distantes du pétiole de la posticale et du bord postérieur de l'aile ; 2e nervure longitudinale 4-5 fois plus éloignée de l'extrêmité du cubitus que du radius ; cubitus éloigné du bord, presque droit, non dépassé par la costale, aussi rapproché de la pointe alaire que la discoïdale ; transversale oblique ; bifurcation de la posticale située à peine distalement de la transvesale ; extrémité du rameau antérieur un peu plus loin de la pointe alaire que la 2e longitudinale. Pattes de la femelle sans longs poils ; métatarse antérieur de moitié plus long que le tibia ; 5e article égal à la moitié du 4e,

3-4 fois aussi long que gros ; tibias postérieurs de moitié plus longs que le métatarse ; empodium filiforme, pulvilles petits ; le mâle a les tibias et les tarses des 4 pattes postérieures munis de poils trois fois aussi longs que leur épaisseur. Abdomen de la femelle faiblement déprimé, un peu plus long que le reste du corps ; celui du mâle plus de deux fois aussi long que le reste du corps ; article terminal de la pince aussi gros et aussi long que le basal, faiblement incurvé et d'égale largeur sauf à l'extrêmité distale, qui est à peine plus mince. Taille 2,5 mm.

Capturé pendant la nuit, à bord d'un vaisseau, dans le canal de Suez, le 9 octobre 1907 ; 8 exemplaires (N. Annandale).

Séance du 21 Avril 1920

Présidence de M. Leonidas Iconomopoulos

Nominations :

Sur la proposition de M. le Dr Walter Innes bey et de M. Hassan Efflatoun, Son Excellence Mohamed Efflatoun pacha et M. Ismat Timour sont nommés membres titulaires.

Communications

The Life-history of *Telmatoscopus meridionalis*, Eaton (Dipt.)

(including 2 plates)

by H. C. Efflatoun M. R. A. C. ;

M.S.E.A.C. Hons. Ent.; F.E.S.

Assistant-Professor of Biology, School of Medecine, Cairo.

Introduction.

The life-history of the members of this family of Psychodidae has recently been the subject of much attention with regard to the blood suking members of the genus *Phlebotomus*, but hitherto comparatively little has been published on the non blood sucking genera *Pericoma*, *Psychoda*, *Telmatoscopus*. Having btained large numbers of the adults and develop-

mental stages of *Telmatoscopus meridionalis*, Eaton, a common Egyptian species, the opportunity was taken of studying the life-cycle of this individual in detail.

The immature stages of the species in question were first observed in very large numbers, living together with other dipterous larvae in a water-tank used for macerating bones, at the School of Medicine, Kasr-el-Aïny. The tank in question contained floating pieces of bones covered with decaying meat & the Psychodid larvae occurred on the surface of the water. From the latter adults were obtained and identified as *Telmatoscopus meridionalis*, Eaton.

Later, very large numbers of the larvae and pupae were found in a small covered well containing drainage water ; the larvae were feeding upon decaying vegetable matter, such as leaves, twigs etc. floating in the water. Swarms of the adult flies were found on the walls of the well. Some of these flies were collected & brought to the laboratory in order to follow their life-cycle.

For this purpose pairs of flies were placed in wide-mouthed glass bottles contaning a few decaying leaves in a little water, the mouth of the bottle being covered with muslin. By these means it was possible to observe the copulation & obtain the progeny of a single female.

The process of copulation in this species is identical with that of *Psychoda sexpunctata*, studied by Mr Dell (1905), and may be described in his own words : « In copulation the male runs alongside the female, stroking her with his antennae while the wings, antennae & halteres are thrown into spasmodic

vibrations. The large forceps is then extended directly backwards & the abdomen of the male bent round so that the hinder ends of the two bodies are brought into opposition. The forceps then close upon the body of the female, unless they miss, which not infrequently happens, as the male fly is unable to see what he is doing. In such a case the whole manœuvre is repeated. The males are apparently unable to distinguish which of their companions are females as they very frequently attempt to copulate with one another ».

The eggs after being laid were kept at a temperature of about 15° C. to 17° C. & the young larvae hatched out six to ten days after laying. The period is probably shorter in summer than in winter, the time when my observations were made.

The young larva when hatched immediatly makes its way to one of the soft decaying tissues. Its characteristic habit is to carry its tail buoyed up at the surface of the water by the floating cup formed by the radiating filaments.

If the water is much disturbed & the larva made to sink to the bottom it is able to retain a bubble of air between the tail filaments of sufficient size to support respiration until it can rise again to the surface.

There are four larval stages, the duration of each gradually lengthening from about seven days for the first stage to about three weeks for the last. The habits and appearance of the larvae are similar in all stages; in every case they become very much darker and more opaque previous to a moult.

When the pupa appears it is white but it turns

brown after the lapse of a day or two. It floats on the surface of the water with the body inclined at an angle of about 45° with the surface, and the respiratory appendages breaking the surface film. After the lapse of seven to ten days the fly emerges from the pupal skin & after about an hour's time its wings dry and it is able to fly away. The flies are able to copulate the same day ; apparently they do not feed at all, since I have never seen them take in food, nor have any traces of food been observed in their alimentary canals.

The egg.

The egg of *T. meridionalis* is lenticular in shape and vere minute ; its dimensions being 0·4 to 0·5 mm. in length by 0·1 to 0 2 mm. in breadth. It is opaque and full of yolk granules and the surface of the egg has a dirty white appearance. They are irregularly arranged in the mass and unconnected with one another. The egg mass is indefinite in shape and its total length varies from 2-7 mm. Hatching takes place 6 to 10 days after laying.

First stage larva.

After hatching the larva is 0·3 to 0 4 mm. in length by 0 06 to 0 08 mm. in breadth, cylindrical in shape & does not bear any locomotor appendages, but moves in a vermiform manner. It exihibits practically all the characters of the full-grown larva, with the exception that it is lighter in colour & more transparent ; in addition the radiating filaments of the anal processes do not form quite such a regular circle owing

to the filaments being much shorter & hence not meeting.

The growth is fairly rapid and after a period of from 5 to 8 days, the young larva attains a length of 1, 3 to 1. 5 mm. by 0. 2 - 0. 3 mm. in breadth & then moults.

Second stage Larva.

During this stage the larva grows to a size of about 3 to 3. 3 mm. in length by 0. 5 mm. in breadth. The filaments of the anal processes become relatively longer. The appearance of this stage comes to approach more closely that of the adult larva.

The duration of this stage varies from 14 to 16 days.

Third stage Larva.

In appearance this 3rd stage closely resembles sthe preceding but may be distinguished by its large ize, being about 4. 5 to 4. 8 mm. in length by 0. 8r mm. in breadth. The duration of this stage is from 14 to 18 days, after which it moults to the adult larva.

Fourth stage Larva.

The full grown larva measures from 8 to 9 mm. in length by 1. 4 mm. in breadth. The body is cylindrical & consists of eleven segments and a head.

The head is small & completely exserted and on its sides, below the minute antennae are the eye spots, which are oval in shape, convex & pigmented. In the centre if the upper surface of the head is the clypeus, which. so very characteristic in form, construction & position

It is somembat triangular, pointed behind and adorned in front by a spray of beautiful long filaments. The larvae may often be seen to run these filaments between the strong mandibles, probably in order to clean them.

The labrum is prominent, setigerous and very movable, being continuously extended and withdrawn by the living larva. The mandibles are very strong, palmate and bent at an elbow, each with 5 pointed teeth; they are provided with a bunch of long setae on the elbow.

The maxillae are represented by two side plates, which bear setae, and three chitinous, finger-like processes. Between the maxillae, in the median line, is a comb-like plate, which probably represents the submentum. In front of it, also in the median line is an other comb-like plate or process, but with much bigger and stronger teeth. This structure probably represents the hypopharynx or lingua. Behind this comb are the openings of the salivary ducts.

The whole of the mouth parts are enclosed in a sunken and roughly triangular space, which occupies the anterior part of the ventral surface of the head.

The margin of this space has a thick, stiff and chitinous ring.

The segments of the body are subdivided by transverse constrictions which makes it rather difficult to separate them. Each thoracic segment consists of two annuli and a trace of a third, but the constriction is not complete, while most of the abdominal segments consist of three annuli. The first abdominal segment has only two annuli and the eighth is apparently un-

divided. The second annulus of the first prothoracic segment bears the pair of anterior spiracles on its sides. They project as short cylindrical tubes with wrinkled bases and circular openings.

The body is densely covered with chitinous tubercles which are mostly very minute. They appear under the microscope like nails embedded in the skin. The annuli are provided with transversely arranged dorsal shields. The more exposed parts of the annuli are protected by chitinous shields in addition to the tubercles. Every dorsal shield bears a longitudinal row of short, conical processes, each of which ends in a long and stout seta. The middle annulus of most of the abdominal segments is provided with four small and distinct plates, which are placed laterally and are more chitinous than the neighhouring integument. The sides of the body bear a lateral row of close-set setae, with here and there a larger plate, and processes bearing much longer setae.

The eighth and last abdominal segment is cylindrical and truncate, somewhat tapering towards the end and is enclosed dorsally and laterally by a single large shield which bears seven pairs of setae : two pairs ventrally, one longer pair dorsally and four pairs laterally. Ventrally this eighth segment is more flexible and is provided with á central scutcheon which bears a pair of long setae along its upper end and three shorter pairs towards the centre. The anus is situated about the centre of the scutcheon and is surrounded by three plates, one anterior and two lateral. The anterior and median plate is triangular in shape; its two free sides are concave and each provided with

a row of short, stiff and fairly stout bristles, interlacing with those of the lateral plates. The two lateral plates are also somewhat triangular in shape and arranged one on each side of the median line so that their free sides, together with those of the median plate, form three radiating slits. Their free edges, as in the former plate, bear stiff bristles, which are smaller and shorter than those of the median plate; in addition each bears three setae. The anterior and median plate is provided also with four long setae.

The extremity of the eighth abdominal segment bears four anal processes : two dorsal and two ventral. The dorsal pair is much longer than the ventral but they are both more or less similar in shape and construction. Each process consists of a chitinous rod bearing at its sides and tip a fringe of fine hairs or filaments, which on the dorsal pair of processes are slightly curved downwards at the tip and on the ventral pair slightly curved upwards at the tip. The length of the filaments gradually increases from the base to the extremity of the rod and the processes somewhat resemble plumes. There is a much longer filament in the centre of the rod. The posterior pair of spiracles are found immediately above the bases of the ventral pair of processes.

The Pupa.

The pupa is from 5.5 to 7 m/m. in length by 1.9 to 2.8 in breadth. It is white when it first appears, but it soon turns dark brown owing to the thickening of the cuticle. It is provided with a pair of trumpet—shaped respiratory appendages which are situated on

the front of the prothorax. These are somewhat club-shaped, with a short transversely wrinkled stalk and a cylindrical terminal part, which is much longer and wider than the stalk. There is a spirally arranged row of small circular foramina beginning at the base of the stalk and ending at the summit of the trumpet. The legs of the fly enclosed in their pupal sheaths are straight, and reach to the beginning of the second abdominal segment. The tips of the wing sheaths also reach to the beginning of this segment. All the exposed abdominal segments, as in many other pupae of this and other families, are protected by dorsal and ventral plates whose hinder margins are provided with backwardly directed spines. The last abdominal segment bears five pairs of large spines, one terminal, two dorsal and two ventral. They enable the pupa to move about either in water or in semi liquid filth and also help to keep the respiratory appendages exposed to the air. When placed in water the pupa floats at the surface with the body inclined at an angle of about 45° to the surface of the water and the respiratory appendages breaking the surface film. The abdomen can be bent to either side and can also be slightly flexed and extended.

While this note was in the printers hands, I received Mr. A. Tonnoir's recent article on African Psychodidae (1920) which contains a very detailed description of *T. meridionalis*, Eaton, based on the examination of 250 speeimens from various sources.

The following brief description of the external features of the fly are based on his excellent account,

which closely agrees with what I have observed in egyptian examples of this species.

The fly when at rest and seen sideways has a characteristic attitude: the wings are held horizontally over the back and the body is bent downwards, while the antennae have the apex of the flagellum much curved outwards.

Length of male: 2—2 1/2 mm.

Antennae: moniliform, porrect, 16-jointed, as long as the breadth of the wings. The first joint is cylindrical, the second globular, and the third and following joints of the flagellum flask-shaped, (i.e. provided with a narrow collar and a swollen globular base). Flagellum verticellate, well furnished with hairs, which vary in colour from pure white to grey. The swollen base of each joint is provided with two whorls of curved hairs.

Head: small, sessile. Eyes lunate. Palpi four-jointed, exserted; the joints are not equal in length, the second joint being by far the longest, all covered with dark hairs; likewise the epistoma and face. The frons is furnished with erect hairs which are whitish at their extremity, while the hairs of the vertex are greyish.

Wings: broad, ovate-lanceolate, very hairy, R 5 ending exactly at the apex.

Bifurcation of R2 R3 situated well before the middle of the wing, while that of M1 M2 nearer the base. Vestiture of wings of a more or less deep brownish-grey colour with certain parts white and others yellowish. There are two black tufts of erect hairs around which are adhering a reduced number of white hairs: one is on R2 and the other on the M2, in both cases situated

a little after the bifurcations of the radials R2 R3 and the medians M1 M2.

At the extremity of all the nervures, with the exception of R5 and A, is found a small white spot composed of erect and oblique white hairs.

The alar fringe is well developed, its hairs generally possessing a much lighter extremity.

The hairs of the fringe on the inferior region are longer than those on the superior region.

Thorax: the vestiture of the thorax is very dense and tufted, of variable colour; it is as a rule greyish, but sometimes dirty white or even brownish.

Legs: appear very thick owing to their being covered with dense black hairs, and to the ventral and dorsal fringes of black hairs on the tibiae. They possess ringlets of white hairs on the apex of the tibiae and metatarsi.

Abdomen: Shorter than the wings and hairy: its vestiture is as a rule darker than that of the thorax; it is composed of grey hairs interspersed with white. Often the tufts of darker hairs are disposed in transverse stripes alternating with the stripes of lighter hairs, and thus, to some extent, separating the segments, which are eight in number.

Length of female 3-4 mm., very similar to the male but is as a general rule larger. This furnishes a useful assistance for separating the sexes in large series.

In conclusion I desire to express my indebtedness and thanks to professor E. Hindle, at whose suggestion the work was first taken up, for much helpful advice and criticism.

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Séance du 30 Juin 1920

Présidence de M. le Major Stanley Smith Flower

Nominations :

Monsieur l'ingénieur Giovanni Gribodo, de Turin, qui s'est spécialisé dans l'étude des Hyménoptères Aculeata, est élu membre honoraire de la Société, proposé par MM. le Dr W. Innes Bey et A. Alfieri.

Sur la proposition de M. Edgard Chakour et de M. Anastase Alfieri, M. Waldemar Vogel, d'Alexandrie, est nommé membre titulaire.

Communications

Notes concernant la biologie de la *Pachnoda fasciata* F. (Col.)

par Anastase Alfieri

Le 8. 8. 1919, Saïd eff. Bahgat, assistant entomologiste de la Société Sultanienne d'Agriculture, remarqua un petit groupe de *Pachnoda fasciata* dans l'enclos de cette Société à Ghézireh. Intrigué des allées et venues

de ces Cétonides, qui s'abattaient lourdement sur le sol et le fouillaient. Saïd eff. Bahgat en captura quelques unes et procéda ensuite à l'examen des lieux. Le sol était légèrement fissuré et bosselé à cet endroit, et l'on pouvait se rendre compte qu'un groupe de champignons croissait en dessous, presque à fleur de terre. Ces champignons exhalaient une odeur difficile à définir, rappelant beaucoup celle des fleurs du Henné (*Lawsonia alba*), qui attirait les insectes.

Quoique la *Pachnoda fasciata* se capture communément sur les fleurs du pêcher et parfois sur les roses, l'opinion lui attribue à tort la *Lawsonia alba* comme essence nourricière, car c'est surtout sur les fleurs de cet arbuste que l'on capture le plus de spécimens.

Cet article établira que les *Pachnoda*, tout comme certains Dynastides d'Egypte (*Pentodon*, *Heteronychus*), se nourrissent à l'état larvaire de racines diverses et de matières végétales. Les *Pentodon* et *Heteronychus* adultes continuent à se nourrir ou à endommager les racines ou bien les tiges tout près des racines, mais les Cétonides adultes ne semblent être attirées que par les fleurs. L'on voit ainsi les roses attaquées par la *Pachnoda fasciata*, par les *Cetonia Delagrangei* Boucard et *floricola* var. *ignicollis* Gory et surtout par la *Tropinota squalida* Scop., et les fleurs du pêcher et celles du Henné attaquées par la *Pachnoda fasciata*.

Les *Pachnoda* capturées par Said eff. Bahgat étaient trois femelles. Pour en faire l'élévage, je les plaçais dans un grand pot à fleurs rempli de terre et recouvert de tulle. Les insectes ne tardèrent pas à s'enfouir dans le sol. Le 11. 8. 1919, c'est-à-dire trois jours plus tard, je trouvais 60 œufs disséminés dans la terre, mais je ne

puis préciser si c'est là la ponte d'une femelle ou des trois femelles simultanément. Il n'y eut plus d'autres pontes. Le 30. 8. 1919 les pondeuses étaient mortes.

Les œufs de la *Pachnoda fasciata* sont de forme et de dimensions fort variables. Ils sont tantôt elliptiques, tantôt ovales mais en général plus ou moins ronds. Les plus petits mesurent 1. 5 mm. de diamètre lorsqu'ils sont parfaitement ronds, les plus grands en mesurent 2.5 dans ce même cas. S'ils sont ovales ou elliptiques la longueur des plus petits atteint 2 mm., celle des plus grands 3 mm. Ils sont légèrement chagrinés, blanc laiteux en couleur et peu brillants. A fur et mesure qu'ils séjournent dans la terre leur écorse se ramollit sous l'influence de l'humidité du sol et peut-être aussi sous la pression de l'embryon qui se développe à l'intérieur, ce qui augmente un peu leur dimension. Peu de jours avant l'éclosion des jeunes larves les œufs prennent une teinte d'un blanc sale, terreuse, ils sont mous au toucher, presque transparents, et l'on voit distinctement la larve déjà presque formée à l'intérieur.

Les éclosions eurent lieu entre le 18.8 et le 1.9.1919, date à laquelle j'examinais la terre du pot d'élévage. Il y avait 40 jeunes larves sur 60 œufs qu'il contenait. Les 20 œufs restants ne donnèrent aucune éclosion. Je ne conservais que 32 larves pour l'élevage et les distribuais dans deux pots, en nombre égal.

Les toutes jeunes larves ont environ 5 mm. de longueur, le dessus et le dessous du corps peu recouverts de poils courts et blonds, leur tête est légèrement brunâtre, les parties buccales plus foncées. Au terme de leur évolution leur longueur atteint environ 4 cm., les couleurs primitives prennent une

teinte plus foncée, les poils deviennent plus longs, plus roux. Il est très difficile, sans nuire à l'élevage, de suivre de près l'évolution des larves, d'établir le nombre de mues et les dimensions des larves après chaque mue. J'ai donc examiné mes pots à périodes espacées, inégales. Vers la fin d'octobre les larves étaient complètement développées. A partir de cette époque elles se nourissaient peu ou presque pas, attendant le moment de se transformer en nymphes. Vers la fin du mois de février elles commencèrent à construire leur cellule, une sorte de coque pétrie dans la terre, au fond du pot, probablement à l'aide des sucs de la larve. Les coques sont plus consistantes que la terre dans laquelle elles sont pétries. Leur forme est plus ou moins ovale, la longueur de 2 à 3 cm., la largeur d'environ 2 cm., l'intérieur légèrement tapissé d'une substance mate qui serait produite par les sucs salivaires de la larve.

Pendant les mois de mars, avril, mi-mai, les larves restent à l'intérieur des cellules. Vers la seconde moitié de mai la nymphose commence. On s'en rend compte par le ballotement de la nymphe contre les parois des coques que l'on secoue.

La nymphe a plus ou moins l'aspect de l'insecte adulte, moins les élytres dont on ne voit que des téguments et la couleur presque uniforme d'un ochre jaune doré.

Les adultes éclorent à partir de juin, soit un minimum de 15 jours après la nymphose. L'insecte se dégage en brisant sa coque, à l'intérieur de laquelle on trouve les peaux de la dernière mue de la larve et celle de la nymphe. La dernière éclosion eut lieu le 25.6.1920.

En conclusion, depuis la ponte jusqu'à l'éclosion de l'adulte, le cycle évolutif de la *Pachnoda fasciata* varie de 295 à 320 jours. Cette Cétonide n'a donc qu'une seule génération par an.

La méthode d'élévage employée est des plus simples : un ou deux épis de maïs avec leurs graines enfouis dans la terre du pot d'élevage, maintenir cette terre toujours légèrement humide par des arrosages en temps voulu, les graines germent, produisent des racines dont les larves de la *Pachnoda* en sont fort friandes.

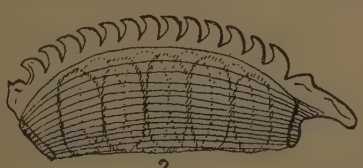
Description de l'oothèque inconnu de *l'Heterogamia aegyptiaca* L. (Orthop.)

par Anastase Alfieri

Coque transparente, d'un jaune doré, en forme de sac, offrant une soudure médiane supérieure, longitudinale, arquée, terminée en une série de 15 arêtes dont 13 semblables, en forme de dents recourbées, la 14e terminée en pointe, la 15e allongée en arc, munie d'une dent, arrondie à l'extrémité ; soudures latérales formant l'une un angle externe d'environ 90°, l'autre un angle d'environ 45° ; ligne médiane inférieure totalement oblitérée ; faces antérieure et postérieure marquées chacune de 13 stries très en relief, presque horizontales peu après le milieu inférieur et progressivement arquées et espacées vers le sommet ; arêtes finement marquées sur les deux faces de la bordure externe de stries verticales et parallèles, d'une ligne parallèle à la bordure interne, d'un dessin central

en cul de sac. Longueur totale 12 mm., hauteur totale 4 mm., épaisseur 3 mm.

1



2

4

3

1. Section de l'oothèque montrant aussi la disposition des œufs. — 2. Oothèque vu de face. — 3. Détails des arêtes. — 4. Grandeur naturelle.

La transparence de la coque permet de se rendre compte qu'il n'existe pas, à l'intérieur de l'oothèque, des cellules renfermant les œufs. Ceux-ci, au nombre de neuf, sont renfermés dans l'oothèque sur deux rangées, une de cinq et l'autre de quatre œufs accolés. Ils sont cylindriques, arrondis aux extrémités, longs d'environ 3 mm., larges d'un millimètre.

Cet oothèque fut pondu le 5 mai 1920 par une femelle capturée le 1 Mai 1920 par Monsieur Joseph Boccacci.

Séance du 27 Octobre 1920

Présidence de M. le Major Stanley Smith Flower

Nomination :

Sur la proposition de M. Ernest W. Adair et de M. Gilbert Storey, M. le Capitaine Kenneth J. Hayward est nommé membre titulaire.

Communications

Contributions à la faune entomologique du Nord-Est du Sinaï

par Anastase Alfieri

Au retour de son expédition géologique du Nord-Est du Sinaï, Monsieur R. Fourtau, géologue du Museum du Caire, me remit un lot d'insectes qu'il avait recueillis entre la mi-Mars et la mi-Mai 1920.

L'étude des récoltes de monsieur Fourtau présente un double intérêt : elle étend jusqu'à la frontière politique de l'Egypte, à El Arish, la distribution géographique d'un certain nombre d'espèces de la vallée du Nil ; elle donne un petit apperçu de la faune des régions explorées.

Les descriptions des nouveautés mentionnées dans cet article, sont dûes à Monsieur Maurice Pic, de Digoin.

Liste des espèces récoltées et quelques notes sur certaines d'entre elles.

COLEOPTERA

Fam. ***Carabidae*** :

1. *Scarites striatus* Dej. — Le soir, à la lampe, entre Abou Diab et El Mishedi.

Espèce connue d'Egypte, Tripolitaine, Algérie, Tunisie.

Les spécimens rapportés par monsieur Fourtau ont cependant les interstries des élytres légèrement convexes, caractère spécifique du *S. Polyphemus* qui a été mis en synonymie avec *S. striatus*. Ils sont de taille plus grande que celle de mes spécimens d'Egypte.

2. *Anthia sexmaculata* Fab. — Lanafet el Rissan. Espèce connue d'Egypte, des dunes sablonneuses.

3. *Graphopterus serrator* Forsk. — Lanafet el Rissan et El Sir.

Espèce très variable et répandue sur toute la région désertique du Nord de l'Afrique, de l'Algérie, et jusqu'en Syrie méridionale.

4. *Hetaracantha depressa* Brullé — Wadis Mezara et Oum Shousha.

Très rare en Egypte.

5. *Masoreus Watterhalli* var. *ægyptiacus* Dej. — El Arish : Gebel el Helal.

Se retrouve en Egypte.

6. *Sphodrus leucophthalmus* Linné — El Arish : Wadi Helal; Magdaba.

Diffère très peu des exemplaires d'Egypte.

7. *Lebia arcuata* Reche. — Gebel el Arish.

Espèce connue de la Syrie, non signalée d'Egypte.

Fam. ***Histeridae*:**

8. *Hister ? Lethierryi* Mars. — Magdaba.

Cette espèce connue de l'Espagne et de l'Algérie est caractérisée par sa forme oblongo-parallèle, fortement convexe ; la strie suturale est presque entière. Ponctuation régulièrement très dense sur le pygidium et le propygidium. Saillie prosternale horizontale très courte et obstusément arrondie.

Note : La strie latérale externe du pronotum varie beaucoup chez cette espèce. Souvent elle consiste seulement en un court arc aux angles antérieurs ; dans d'autres cas, elle atteint le milieu et même la base. Chez l'unique exemplaire rapporté par monsieur Fourtau, la strie latérale externe atteint la base du pronotum.

Non connu d'Egypte.

9. *Saprinus ornatus* Er. — Entre Abou Diab et El Mishedi.

Pas rare en Egypte.

Fam. ***Cantharidae*:**

10. *Malachius Fourtaui* n. sp. Pic — El Arish : Gebel el Helal.

Parum elongatus, fere opacus, viridi-aenescens, elytris antice lateraliter et apice luteo notatis.

Un peu allongé, presque opaque, vert à reflet bronzé

par places, élytres marqués de jaune brièvement à l'extrémité et longuement en avant sur les côtés. Tête plus étroite que le prothorax, impressionnée entre les yeux ; antennes courtes et minces, nettement dentées ; prothorax court, un peu rétréci en avant, à peu près de la largeur des élytres ; élytres pas très longs, un peu élargis en arrière, finement ruguleux, ornés de deux macules jaunes, une petite apicale et une autre subhumérale externe qui se prolonge en arrière étroitement et assez longuement sur la marge ; pattes grêles. Long : 3. 5 mill. (coll. Alfieri et Pic).

Voisin de *M. 6-plagiatus* Ab., mais de forme un peu plus allongée et macules des élytres différentes.

Fam. ***Cleridae*** :

11. *Necrobia rufipes* Degeer — Wadi Karam.
Espèce très répandue.
Egypte.

Fam. ***Coccinellidae*** :

12. *Coccinella undecimpunctata* L. — Wadi Karam ; Cheik Hamid et El Kreig.
Espèce très variable et très répandue.
Egypte.

13. *Coccinella septempunctata* L. — Wadi Ain el Gederat ; El Arish : Gebel el Helal.
Pas rare en Egypte.

Fam. ***Buprestidae*** :

14. *Julodis cicatricosa* Luc. — Lanafet el Rissan ; Wadis Karam et Lagama.
Très variable, capturé sur *Retama retam*.

15. *Steraspis squamosa* var. *tamariscicola* Thoms. — Wadi El Arish, un exemplaire crevé, sur le sable, à proximité de *Tamarix* sp.

Espèce très commune en Egypte, surtout dans la région du Fayoum.

Fam. ***Bostrychidae*** :

16. *Enneadesmus forficula* Frm. — Meghara, le soir, à la lampe.

Cette espèce est signalée d'Egypte, mais je ne l'ai jamais trouvée dans le pays.

Fam. ***Ptinidae*** :

17. *Ptinus xylopertha* Reiche et Saulcy — Wadi Ain el Gederat ; El Arish : Gebel el Helal.

Tous les exemplaires rapportés par monsieur Fourtau sont des mâles.

Espèce connue d'Egypte.

Fam. ***Anthicidae*** :

18. *Anthicus iscariotes* Laf. — El Arish : Gebel el Helal.

Pas rare en Egypte.

Fam. ***Meloidae*** :

19. *Meloe murinus* Brandt. — Ain el Gederat.

Cette espèce signalée de l'Espagne, de la Sicile et de Madère, ne m'est pas connue d'Egypte. Je possède cependant un *Meloe* égyptien très voisin, le *M. nanus* Luc.

20. *Lydus syriacus* L. — El Arish : Gebel el Helal.

Très semblable aux exemplaires égyptiens.

21. *Zonabris gilvipes* Chevr. — Entre Abou Diab et El Mishedi.

Peu variable de nos exemplaires égyptiens.

22. *Zonabris incerta* Klug — Entre Abou Diab et El Mishedi.

Varie peu des exemplaires égyptiens.

23. *Zonabris apicipennis* Rche — Wadi Karam; Cheik Hamid et El Krieg.

Les spécimens rapportés par monsieur Fourtau varient sensiblement de la race égyptienne et pourraient former une espèce distincte. Les macules antérieures et médianes des élytres sont bien plus petites que chez les spécimens de la vallée du Nil; la fascie apicale n'est plus qu'un liseret noir bordant cette extrémité.

24. *Zonabris apicipennis* var. nov. *Fourtaui* Pic — Wadi Karam.

Elongatus, niger, elytris rufo-testaceis, apice nigro-cinctis et ad medium minute nigro notatis (coll. Alfieri et Pic).

Chez cette variété les macules antérieures sont oblitérées.

25. *Zonabris jugatoria* Reiche — Wadi Karam; Wadi Meghara; Cheik Hamid et El Krieg.

Espèce signalée d'Egypte, cependant je ne l'ai jamais trouvée ici.

26. *Zonabris jugatoria* var. nov. *Alfierii* Pic — Wadi Karam.

Parum nitidus, niger, elytris non fasciatis sed rufo maculatis (coll. Alfieri et Pic).

Cette variété présente une bordure antérieure rousse

et 4 macules de même couleur, trois disposées longitudinalement près de la suture et une externe avant le sommet, à côté de la 3e longitudinale.

27. *Zonabris litigiosa* Chevr. — Lanafet el Rissan; Wadi Lagama.

Cette espèce est connue de l'Algérie et sa variété *ismalita* Mars. est citée de l'Arabie par De Marseul.

Non signalée d'Egypte.

28. *Zonabris Hemprichi* Klug — Wadi El Helal; Gebel el Helal.

Espèce facilement reconnaissable par les reflets bleuâtres du pronotum et des taches élytrales. Rare en Egypte.

29. *Zonabris mediofasciatella* Pic — Entre Abou Diab et El Mishedi.

Egypte.

30. *Ceroctis corynoides* var. *trizonata* Reche — Cheik Hamid et El Krieg.

Connu de l'Algérie.

31. *Coryna ornata* vâr. *latebijuncta* Pic — Wadi Lagama.

La var. *latebijuncta* se distingue de la forme typique par deux tâches antémédianes, confluant ensemble, qui forment une fascie complète, de plus jointe à la tâche scutellaire.

Espèce connue de la Syrie.

Fam. ***Tenebrionidae:***

32. *Zophosis complanata* Sol. — Wadi Mezara et Oum Shousha.

Très commun en Egypte.

33. *Erodius puncticollis* var. *contractus* Kr.(=*ecostatus* Crotch). — Entre Abou Diab et El Mishedi, et entre Wadi Mezara et Oum Shousha.

34. *Erodius opacus* Er. — Lanafet el Rissan ; Magdaba.

Rare en Egypte.

35. *Erodius bilineatus* Ol. — Magdaba.

Rare en Egypte.

36. *Adesmia dilatata* Klug — Wadi Helal ; Cheik Hamid et El Krieg.

Diffère sensiblement des exemplaires de la race égyptienne par sa couleur noire très brillante et les côtes dorsales bien plus prononcées.

37. *Adesmia cancellata* Klug — Meghara ; Wadi Mezara.

Je possède un exemplaire de cette espèce, recueilli aux environs du Djebel Katerin (Sinai Sud), qui est de taille plus robuste que celle des spécimens rapportés par monsieur Fourtau.

38. *Tentyria ægyptiaca* Sol. — Wadi Mezara et Oum Shousha.

Commune en Egypte.

39. ***Fourtaus*** N. Gen. Pic.

Antennis brevibus, filiformibus ; oculis lateraliter parum angulatis ; clypeo antice truncato ; thorace postice marginato ; scutello indistincte ; elytris antice marginatis ; tibiis apice bispinosis, externe non productis.

Ressemble à *Ammogiton* Peyer. et ayant, avec ce

genre, plusieurs caractères communs ; il en diffère par le labre non pluridenté, mais tronqué en avant, les tibias antérieurs non longuement prolongés extérieurement au sommet, les élytres moins renflés.

Fourtaus brevicornis n. sp. Pic — Gebel el Helal. Oblongus, nitidus, rufescens, elytris nigris, palpis testaceis.

Oblong, brillant, roussâtre avec les élytres noirs, les palpes testacés. Tête assez longue et grosse, un peu moins large que le prothorax, carènée près des yeux, déprimée en avant, à ponctuation fine et espacée, yeux entaillés ; antennes courtes, n'atteignant pas la base du prothorax, à dernier article très petit, 2e et 3e presque égaux, 4e et suivants plus courts ; prothorax court et large, plus large que la tête, un peu rétréci postérieurement, convexe, rebordé, peu échancré en avant, avec les angles antérieurs peu saillants et les postérieurs émoussés, à ponctuation fine et écartée ; élytres peu plus larges que la base du prothorax, un peu angulés aux épaules, assez courts, atténués postérieurement et un peu déclives au sommet, à ponctuation assez fine et écartée ; pattes courtes et un peu épaissies (coll. Alfieri).

Un seul exemplaire.

40. *Machlopsis crenatocostata* Redtb. — Magdaba, Egypte.

41. *Himatismus villosus* Haag — Cheik Hamid et El Krieg.

Rare en Egypte.

42. *Himatismus variegatus* F. et Haag — El Arish; Magdaba.

Espèce très répandue dans toute l'Egypte.

43. *Sepidium* Sol. — El Arish; Gebel el Arish; Wadi Ain el Gederat.

Un grand nombre d'exemplaires ont été trouvés dans les terrains de culture des environs de la ville d'El Arish, d'autres dans les sables du Gebel El Arish.

Pas rare en Egypte.

44. *Akis reflexa* Fabr. — Magdaba.

Très commun en Egypte.

45. *Pimelia angulata* F. — Wadi Helal; Meghara

Commune en Egypte.

46. *Pimelia canescens* Klug — Magdaba.

Egypte, pas rare.

47. *Pimelia Barthelemyi* Sol. — Magdaba.

Pas rare en Egypte.

48. *Ocnera hispida* Forsk. — Cheik Hamid et El Krieg; Magdaba; Wadi Ain el Gederat.

Egypte, très répandue

49. *Ocnera philistina* Reiche — Wadi Karam.

Egypte, pas rare.

50. *Prionotheca coronata* Ol. — Meghara.

Espèce commune en Egypte.

51. *Blaps polychresta* Forsk. — Wadi Ain el Gederat.

Egypte, très répandu.

52. *Blaps sulcata* Sap. — Magdaba.

Egypte, très répandu.

53. *Eurycaulus Henoni* Heyd. — Magdaba.
Egypte.

54. *Anemia Fausti* Reitter — Wadis Mezara et Oum Shousha.
Egypte, pas rare.

55. *Anemia ?seriesetosa* Baudi — Entre les Wadis Mezara et Oum Shousha.
Pourrait être une nouvelle espèce. Un seul exemplaire.

Fam. ***Chrysomelidae***:

56. *Barathraea cerealis* Oliv. — Ain el Gederat
Egypte.

Fam. ***Curculionidae***:

57. *Koenigus palaestinus* Heyden — Ain el Gederat.
Cette espèce, propre aux contrées désertiques les plus désolées, paraît être très rare. Elle est signalée de la Palestine méridionale, de la Tripolitaine, du sud de la Tunisie; d'Egypte (Musées de Berlin et de Dresde, d'après Faust).
Un seul exemplaire.

58. *Coniocleonus excoriatus* Gyll. — Gebel Helal.
Egypte, très commun.

59. *Ammocleonus hieroglyphicus* Oliv. — Magdaba; Wadis Mezara et Oum Shousha.
Egypte, très répandu.

Fam. ***Scarabaeidae***:

60. *Aphodius brunneus* Klug — Magdaba; El Arish et Gebel el Helal.

La plupart des spécimens rapportés par monsieur Fourtau sont beaucoup plus allongés que les individus que je possède d'Egypte.

61. *Aphodius opacus* Rttr — El Arish et Gebel el Helal.

62. *Aphodius lucidus* Klug — El Arish et Gebel el Helal.
Rare en Egypte.

63. *Aphodius longispina* Küst.— El Arish et Gebel el Helal.
Espèce commune en Egypte.

64. *Aphodius sordidus* F. — Magdaba.
Egypte.

65. *Eremazus unistriatus* Muls. — Wadis Mezara et Oum Shousha.
Commun en Egypte.

66. *Scarabaeus sacer* L. — Magdaba.
Egypte, très commun.

67. *Scarabaeus multidentatus* Klug — Lanafet el Rissan; El Arish et Wadi Helal.
Egypte, plutôt rare.

68. *Triodonta Olivieri* Blanch. — Lanafet el Rissan.
Rare en Egypte.

69. *Pachydema palposa* Rttr — Wadis Mezara et Oum Shousha.
Rare en Egypte.

70. *Pachydema ? israelitica* Crotsch. — Moghara et Wadi Mezara.
Très abondant à la tombée de la nuit.

71. *Tropinota squalida* Scop. — Magdaba.
Espèce très commune en Egypte.

72. *Oxythyrea abigail* Reiche — El Arish et Magdaba.
Egypte.

LEPIDOPTERA

Fam. ***Sphingidae*** :

1. *Deilephila livornica* Esp. — Wadi Helal.
Egypte.

Fam. ***Cossidae*** :

2. *Dyspessa kabylaria* Bang. — Gebel el Helal.
Egypte : Mariout.

Fam. ***Noctuidae*** :

3. *Euxoa ypsilon* Rott. — Wadi Ain el Gederat, dans la partie cultivée.
Egypte, très commun.

4. *Euxoa* nov. spec.— Wadi Helal, un seul exemplaire.

5. *Apopestes dilucida* Hb. — Raha.

Fam. ***Geometridae*** :

6. *Thamnonoma? vincularia* — Wadi Lagama.

Fam. ***Pyralidae*** :

7. *Nomophila noctuella* Schiff. — Raha.
Egypte.

8. *Cornifrons ulceratalis* Led. — Raha.
Egypte.

HYMENOPTERA

Fam. ***Sphegidae*** :

1. — *Ammophila ? poecilocnemis* Morice — Cheik Hamid et El Kreig.

Varie de l'espèce égyptienne par l'absence de la partie enfumée aux extrêmités des ailes supérieures.

2. — *Sphex* nov. spec. — Wadi Karam.

ORTHOPTERA

Fam. ***Blattidae*** :

1. *Heterogamia ursina* Burm. — Magdaba.
Egypte.

Fam. ***Acrididae*** :

2. *Poecilocerus bufonius* Klug — Wadi Karam ; Wadi Mezara et Oum Shousha.
Egypte.

HEMIPTERA

Fam. ***Pentatomidae*** :

1. *Eurydema ?ornata* L. — Wadi Lagama.
Egypte.

Fam. ***Lygaeidae*** :

2. *Lygaeus militaris* F. — Moghara.
Très répandu en Egypte.

Fam. ***Cicadidae***.

3. *Cicadatra querulens* Pallas — Wadis Mezara et Oum Shousha.

Nouveaux Coléoptères

par Maurice Pic

Callotroglops atrithorax n. sp. — Nitidus, niger, antennis pedibusque proparte testaceis, elytris ad medium late albo maculatis.

Brillant, noir avec les antennes et les pattes en partie testacées, élytres ornés d'une grande macule médiane blanche qui n'atteint pas la suture. Tête grosse, lisse ; prothorax assez court, rétréci en arrière et impressionné devant la base ; élytres pas très larges et assez longs, dépassés par l'abdomen, celui-ci noir ; pattes grêles, 4 antérieures testacées avec les cuisses en partie noires, postérieures noires avec les hanches testacées. Long. 2 à 3 mill. — Egypte : Wadi Hoff (coll. Alfieri et Pic).

Voisin de *C. bisignatus* Ab., mais macule élytrale plus grande et prothorax entièrement foncé.

Hospitopterus N. Gen. — Alatus, capite antice ocellato; antennis gracilibus, articulis 2 primis crassis, sequentibus brevibus, 4 ultimis elongatis ; thorace transverso ; elytris elongatis, subsinuatis ; pedibus gracilibus ; abdomine non prominulo.

Ce nouveau genre, par sa structure antennaire et celle de l'avant-corps, se rapproche de *Thelydrias* Mots., et s'en distingue, à première vue, par la présence d'ailes et la tête nettement rétrécie en arrière.

Hospitopterus Efflatouni n. sp., male. — Elongatus, subopacus, griseo pubescens, pallido-testaceus, pro parte subrufescens, oculis abdomineque nigris.

Allongé, subopaque, orné d'une pubescence grise longue, écartée, testacé pâle, un peu roussâtre sur l'avant-corps, les derniers articles des antennes et le sommet des élytres avec les yeux et l'abdomen noirs. Tête assez longue et pas très large, munie d'une sorte d'ocelle entre les yeux, un peu rétrécie postérieurement, yeux pas très gros et saillants, éloignés du bord postérieur de la tête ; antennes graciles, ciliées, pas très longues, plus claires à la base; prothorax transversal, rétréci en avant, plus large que la tête et moins que les élytres, à sillon transversal médian ; élytres assez longs, subsinués, à peu près de la longueur de l'abdomen, marqués de roux ou d'obscur au sommet ; pattes longues et grêles. Long. 3 mill. — Le Caire (coll. Alfieri et Pic).

Trouvé par M. Efflatoun à l'Hôpital de Kasr-el-Aïni. La femelle inconnue est peut être aptère comme celle de *Thelydrias contractus* Mots.

Séance du 17 Novembre 1920

Présidence de M. Salomon Mezrahi

Nomination :

Sur la proposition de M. Ernest W. Adair et de M. Gilbert Storey, M. le Major W. J. Hall est nommé membre titulaire.

Communications

The Moults of *Empusa egena*

by Dr E. Bugnion

Honorary Professor of the University of Lausanne.
Freely translated by E. W. Adair, B.A., F.E.S.,
Entomologist to the Ministry of Agriculture, Egypt (1).

This contribution is divided into nine sections:

1. Introduction.
2. The larval moults.
3. The imaginal moult.
4. The unfolding of the wings.
5. The circulation of the blood observed in the veins of the wing during their unfolding.
6. The histology of the wing.
7. The causes of the unfolding of the wings.
8. Accidents which occur during moulting.
9. Peritracheal circulation. Blanchard's theory.

(1) Translated from the «Bulletin de la Société Zoologique de France», Vol. LXIV, June 24 & July 8, 1919, with the authorization of the aforesaid Society.

A few additions have been made by the author, including eight new figures.

I. Introduction.

The Empusae being less pugnacious than the Mantides can be bred together. From 1916 to 1918 I managed to catch about fifty of these insects at Aix en Provence. My specimens captured from the end of August to the end of October were young larvae. They were placed in cages made of butter muslin fixed to a wooden base and exposed to the sun as much as possible. They were fed plentifully with house flies, meat flies and, later, with Cabbage Whites and hover flies and lived until the following May or June when the greater number became imagos.

Copulation was observed between the 3rd and 5th of June (1). laying between the 9th and the 30th. The young hatched between the 10th and the 20th of July, the embryonic development having lasted exactly thirty days (2).

One of the advantages of cages with muslin sides is that it is quite easy to observe the moults and the incidents connected with them through the material.

Mantidae have two distinct kinds of moults : 1° *larval* moults, giving a new larva ; 2° the *imaginal* or last moult, which ends with the unfolding of the wings and gives the perfect insect.

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1. The males bred in captivity were usually so weak that I should probably not have obtained any egg-cases if two wild males and a wild female had not been introduced into one of the cages at the right time : June 1st.

2. The 1918-'9 brood was not studied.

In 1920, 31 larvae of Empusa were captured from the 22nd of February to the 19th of March. Thirteen of these died prematurely. The spring having been early, the first imago, a female, was obtained on April 7th. Ten males

According to PAGENSTECHER (1864-65), *Mantis religiosa* has seven moults, or eight if the shedding of the sheath which the embryo leaves at the time of hatching is reckoned as a moult.

According to the very exact observations of E. ADAIR (1914-15, p. 90), the Egyptian Mantis, *Sphodromantis bioculata*, BURM. has sometimes 8 and sometimes 9 moults in either sex, without counting the liberation of the newly hatched larva.

Three larval moults were observed by E. ADAIR in Egypt for each of three specimens of *E. egena* between the date of hatching (Sept. 16, 1913) and the dates of death (Oct. 28, 1913, January 10 and 24, 1914, respectively).

The larval moults of my specimens bred at Aix were wider apart. Judging by the number of cast skins found in the cages, there were only two moults between the time of hatching and the end of the year, and two

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were obtained between April 21st and May 20th and seven other females from May 2nd to 23rd. Three other females captured in the field were added, making a total of eleven females.

Copulation was observed between the 21st of May and the 3rd of June. All the males were dead by the 17th of June, while a few females lived during July and August, the last till the 9th of September.

Some of the females laid egg-cases, of which the largest was 18 mm. long and contained 42 egg cells, (counted on a section, arranged in 3 or 4 rows), ten were from 8 to 10 mm. long, and five were very small, abortive, containing only a very few egg cells. Owing to the debility of the males bred in captivity, fecundation seems to have been insufficient, so that only a small number of young hatched, many of the oothecal containing only unfertilised yolk.

or three at most (including the final moult) from January 1st to the emergence of the imago. The total number of moults in the case of Empusa appears to be 4 or 5.

It is possible that the series of moults is less constant and regular in the case of the Mantidae in general than it is, for example, in the case of caterpillars. In order to solve the problem definitely, it would be necessary to breed a few of these insects separately and to watch them constantly from the time of hatching to the emergence of the imago.

II. Larval Moults

Before each moult there is a period of preparation which lasts about two or three days. During that time the Empusa takes no food and remains quite still hanging head downwards from the side of the cage. It is no doubt during this period that the external cuticle separates little by little by a process of delamination from the newly formed cuticle which is destined to persist.

The moult takes place by means of a slit which stretches from the back of the head to the base of the abdomen. It begins behind the three ocelli, splitting in half the mitre, the occiput, the cervical region and the thorax (Fig. 1). This slit, through which the rejuvenated larva is about to escape, opens out along the median line of the cuticle following a suture (line of least resistance) formed previously for this purpose (1).

1. A similarly situated slit is found in the cast skins not only of the Orthoptera but also of Termites, Dragon flies, Cicadidae and generally speakiug of most insects,

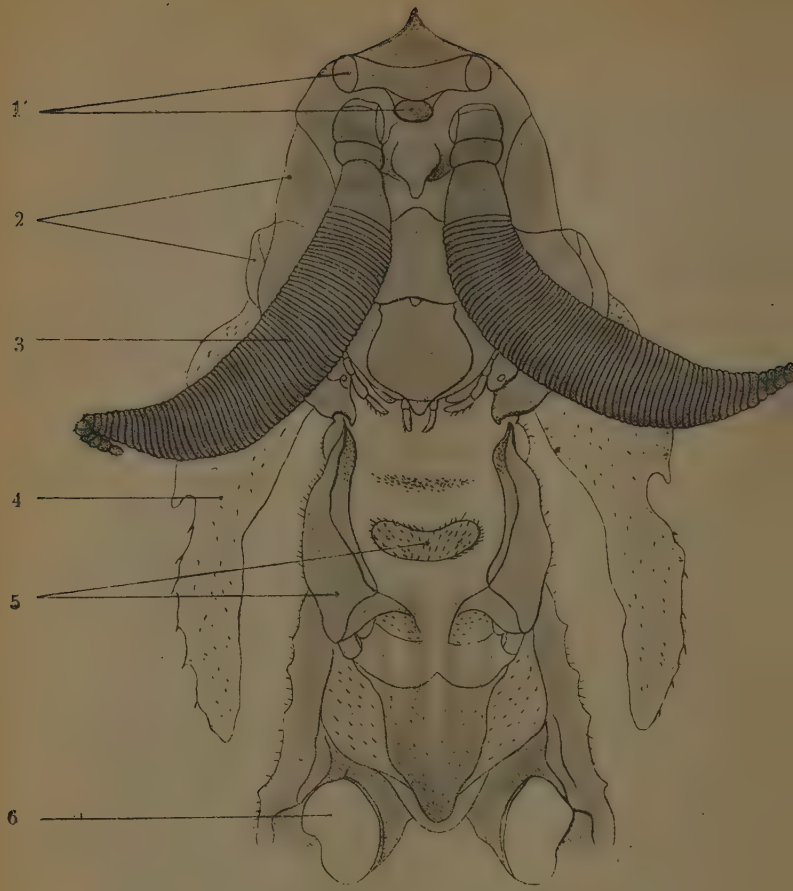

Fig. 1.—New.—*Empusa egena*. Last moult of a male. Fore part of cast skin, ventral aspect × 15.

The two halves of the mitre are seen at the sides as set on the slide.

1. The three ocelli.
2. The region of the compound eyes.
3. The antennal sheaths.
4. Right half of the mitre.
5. Jugular pieces, (median and lateral).
6. Insertion of anterior coxa.

The slit widens and the first part to be liberated is the prothoracic region. For it is the prothorax which, owing to the rythmical contractions of the abdomen, is swollen by a flow of blood and, pressing against the suture, finally bursts it open. The new prothorax, which is slightly curved longitudinally, is seen beneath the cast skin to which it is attached by the head and abdomen. Seen in profile, the insect looks at this moment like two superimposed bodies. One of these, hooked on to the muslin by the posterior and median claws, widely split along the back, is the cast skin. The other, which hangs below, includes among other things, the newly moulted thorax. Besides the four wingiets already freed from their sheaths, the front legs work at liberating themselves. The sheaths of the femora of the front legs push outwards the sides of the groove in the cast skin and protrude within this groove to the end of the prothorax.

The head and prothorax being still confined during this phase, the empty portion of the cast skin is stretched out straight. The much swollen abdomen is no longer raised over the back as in the larva but lies straight in a horizontal plane.

The insect now tries to free the head, mouth parts and antennae by pulling at its front part. This operation lasts about ten minutes.

The head having been freed and the raptorial legs pulled out of their sheaths, the appearance of the Empusa is henceforth quite altered. The front part is suddenly straightened and pushed forward so that the whole of the prothorax projects beyond the front of the cast skin. The insect, now half free, moves its raptorial

legs about in the air without, however, clinging to anything. This phase is distinct from the former and may be called the second stage.

After the head, thorax and raptorial legs comes the turn of the other limbs. Freed from their respective sheaths, the median and hind legs remain at first bent under the abdomen. The insect is still suspended to the muslin by the clwas of the cast skin which have not altered their position since the beginning of the moult. The adhesion of the abdomen to the inside of its sheath is sufficient to bear the slight weight of the animal.

The abdomen is the last part to be set free. Delayed for some time by their foliaceous expansions, the abdominal segments come out one after the other from the hind end of the slit which requires no further lengthening. When the abdomen is on the point of being set free, the median and hind legs are stretched out until they come in contact with the side of the cage to which they immediately cling. Nature has foreseen every thing. The Empusa was never seen to fall (1).

The moult is now finished, but the insect remains for a few minutes motionless hanging beneath the cast skin. Soon, however, it takes a few steps and settles down a little way off. The moult took half an hour.

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1. We have often observed falls in other species of Mantidae and in locusts. This is not usually a serious accident, the insect climbs up the side of the cage and rests as if nothing had happened. When the cast skin becomes unhooked before the insect is quite free very serious results may follow as the insect is still sufficiently soft to be injured by the fall and is unable to withdraw the limbs from their sheaths. (Translator).

As the wings are not unfolded at this stage, there is usually no accident during the moult.

III. The Imaginal Moult.

The last moult is specially interesting owing to the unfolding of the wings. I had an opportunity of watching this on the 17th of May, 1917. I had just returned from an excursion and by chance went near one of my cages when I saw a female nymph head downwards hanging to the muslin by the median and hind legs and just about to moult.

It was exactly 6 pm. Having nothing better to do I was able to examine the whole process at leisure. Here is the exact record taken from my notes :

6. 5. The skin of the back having split in the cephalo-thoracic region, the insect first freed its prothorax. The latter hanging beneath the cast skin and swollen with blood was bent in the shape of a bow as it could not stretch itself straight out owing to the head and the hind segments stiladhering to the old skin : this obviously corresponds to the first stage in the case of the larval moult.

6. 20. The insect having freed its antennae, mouth parts and raptorial legs, the whole of the fore part of the body is now straight; pushed forward and under, it now stretches far beyond the corresponding parts of the cast skin. Indeed these appear shrunken and shortened. In a very short time the moulting process has passed from the first to the second stage (1).

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1. When the imago is a male, the antennae usually equire longer to free themselves.

The median and hind legs are now freed rapidly. The abdomen, however, is still in its sheath.

At this stage the position of the Empusa is as follows : - the body hangs at an angle - head downwards. The front legs, close together with the tibiæ bent back on to the femora, have their knees projecting a little in front of the forehead. The median and hind femora are slightly separated, the corresponding tibiæ and tarsi bent back under the abdomen. At this time the imago receives no support from the muslin. The abdomen still adhering within its sheath, it is the four posterior claws of the cast skin which carry the weight of the body as in the corresponding stage of the larval moult. (Fig. 2).

The newly formed integument is greyish, with brown spots, except the prothorax and the hind femora which (in this particular specimen) have a greenish tinge.

The Insect moves feebly as if it were awaiting nature's help. Nevertheless slight contractions intended to liberate the abdomen can be observed from time to time.

6.25. The claws of the left hind leg of the imago grip the median femur of the cast skin.

6.28. The right hind leg of the imago finds a support on the muslin of the cage.

6.40. The abdomen - entirely freed - retires 1 1|2 cms. away from that of the cast skin. The insect being now entirely free, the hind and median legs have at the same moment clung to the side of the cage.

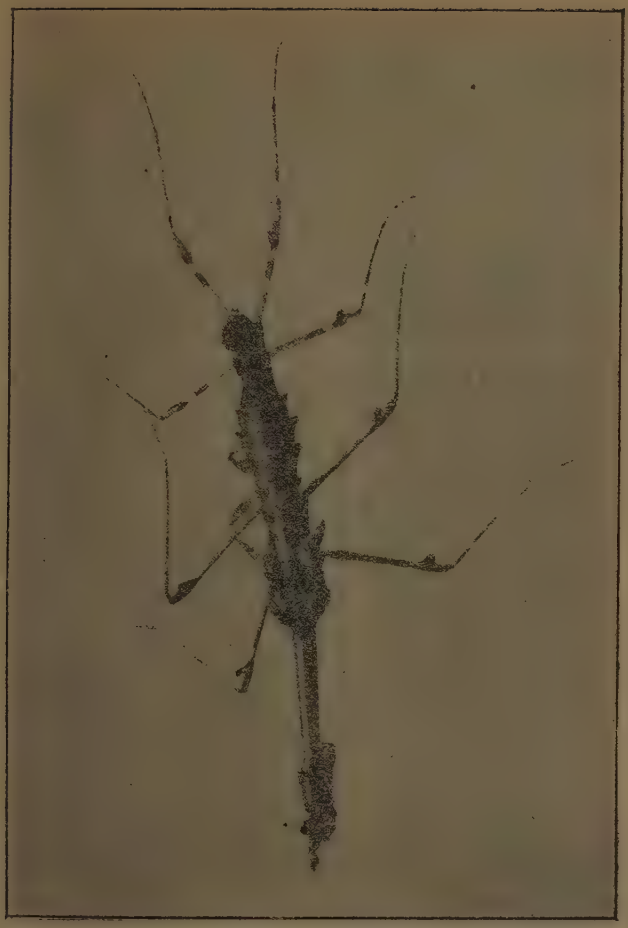
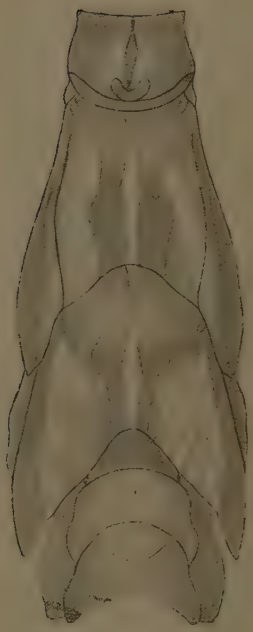


FIG. 2.—New.—*Empusa egena*. Female. In the last stage of the moult. Photographed living. About natural size.

N.B. The Empusa was moulting on one of the small frames introduced into the cage for the convenience of the photographer, as the frame can be taken out of the cage and placed in a suitable position in front of the camera. If the insect had preferred the side of the cage, it would have been carefully removed and placed on the frame by sticking the hind and median tarsi of the cast skin with a little gum arabic placed on the muslin. This does not interfere with the moulting.

IV. The Unfolding of the Wings.



Before the moult, the wing stumps looked like four small strips along the back, but the direction of these organs is now altered. This will be made clear by comparing figs. 3 to 7.

Fig. 3 is drawn from a nearly mature larva and shows the wing stumps as they appear before moulting. Fig. 4 shows the same organs when the unfolding is about to begin. Relat ively very short, 1 cm., the stumps, and more especially the hind pair, have deviated from the median line to a considerable extent. Moreover it can be seen that, contrasted with

FIG. 3.—*Empusa cœca*. Male larva, 30 mm. long Killed November 2nd 1917.
Rudiments of fore and hind wings. × 1 1/2.

N.B. The neuration shown in this sketch is that of the cuticular sheath. The true wings, which are forming within, already show many folds visible on clearing in Canada balsam.

Fig. 4.—New, replacing Fig. 2 of French edition — *Empusa egena*. Male. Photographed living 10 minutes after moulting. The wings are beginning to unfold. × 1 1/2. Length of wing stumps :—9 to 10 mm.

those of the larva, they show a basal portion slightly swollen and lighter in colour, and a flatter, opaque apical portion, slightly rolled up along the edges and ending in a blunt point.

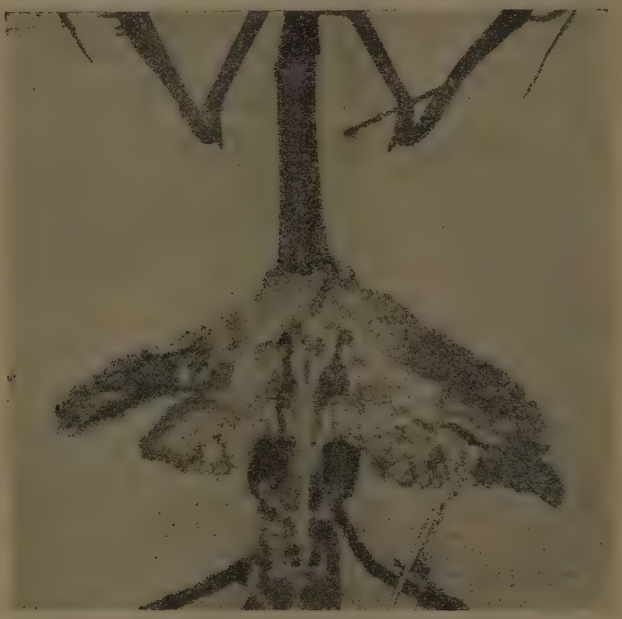


Fig. 5 —*Empusa egena*. Male photographed 20 minutes after moulting. × 3.

For the purpose of taking the photograph, the wings were set on bits of cardboard. Length of the body :—5 cm , length of the stumps :—13 mm.

Just before taking the photograph shown in fig. 5, the stumps were pinned out on a card so that their

structural details are more clearly seen. Moreover they are now slightly longer - 13 mm. long - and the magnification slightly greater $\times 3$.

The crumpled appearance of the apical portion is due to the many folds caused by the stump being compressed while still in the sheath.

Figs. 6 and 7 drawn from preparations in Canada balsam show these same folds in a more diagrammatic

Fig. 6. – *Empusa egena*. Male killed immediately after moulting. Canada balsam preparation of the front wing-stump. $\times$ 10. Length of stump :— 9 mm., area of surface:— 24 sq. mm. From a drawing by J. d'Aleman.

form. The central trachea is seen in each of them and around it the peritracheal sheath unevenly swollen by the blood which is rushing into it.

Let us resume the record of events from the time when the unfolding began.

It is 6. 40 and the wing stumps swollen by the blood which begins to flow into them, have taken the shape already described (Figs. 4 and 5). All four show at this period a convex basal portion, distinctly tumefied, and a flatter and narrower apical portion with many folds.

6.47. The Empusa has withdrawn a little way from the cast skin. The hind wings are almost covered by

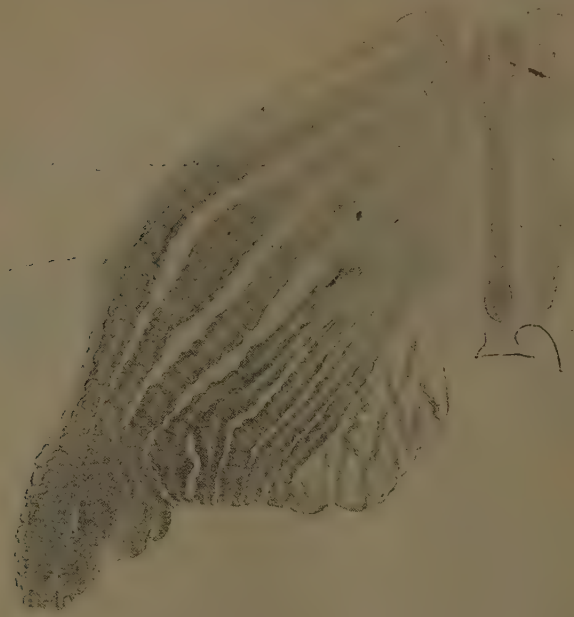


Fig. 7.—*Empusa egena*. Hind wing-stump of the same. × 10. Prepared in Canada balsam. Length of stump:—10 mm., area of surface:—37 sq. mm. From a drawing by J. D'ALEMAN.

the larger and more swollen fore wings. The tip of the former is bent inwards and downards (Fig. 8).

6.52. The Empusa alters its position. Using its raptorial legs, it climbs to the top of the cage and settles head upwards.

Fig. 8.—New.—*Empusa egena*. Male. Photographed living on a piece of muslin.

The fore wings more swollen, and 2 cm. long, completely hide the hind pair (Fig. 9).

Fig. 9.—New.—*Empusa egena*. Male, slightly more advanced. Photographed living. Note apical portions of the four wings still unswollen and very well shown behind the portion already developed.

6.56. The injection and swelling still progressing, the wings now reach the middle of the abdomen.

Fig. 10 — *Empusa egena*. Male. Photographed 20 minutes after moulting. × 2. The wings swollen with blood surround the abdomen like a little green petticoat.

They now look like a little green petticoat hung round the waist of the Insect, as shown in Fig. 10.

7. 3. The fore wings - 3 cm. long - now reach the penultimate foliaceous expansions of the abdomen ; the Insect separates them slightly from time to time ; the hind wings, slightly shorter, still have the tips bent inwards.

7.12. The fore wings - 4 cm. long - reach the place of insertion of the cerci ; the hind wings - about 8mm. shorter - still have the tips bent.

7.15. The fore wings almost reach the extremity of the body.

7.22. The fore wings have reached the extremity of the body ; the hind pair - strongly injected - project between them.

7.35. The hind wings entirely spread out, also reach the end of the body. Still swollen with blood, they are still convex, and have not yet begun to fold longitudinally. (Fig. 11).

In this case the unfolding has taken exactly 55 minutes. The wings, which at 6.40 were at the most 10 mm. long, have at 7.35 reached their largest area. (Figs. 12 and 13).

The measurements of the wings of the adult male are:

Fore wings : — maximum length	35 mm.
" " " width	8 mm.
Area	230 sq. mm.
Hind wings : — maximum length	33 mm.
" width	15 mm.
Area	377 sq. mm.
Total area of the four wings	1214 sq. mm.

Fig. 11.—New.—*Empusa egena*. Male. Photographed living in full sunshine on a spike of *Sedum altissimum*. The four wings fully developed and still swollen with blood.

FIG. 12.—New.—*Empusa egena*. Male. Photographed from a set specimen. Slightly larger than natural size.

For the female :

Fore wings : —	maximum length	31 mm.
	,, width	8 mm.
Hind wing : —	maximum length	30 mm.
	,, width	13 mm.

The area of the four rudiments at the end of the moult can be estimated at 122 sq. mm. Thus the unfolding has multiplied the area of the four wings by 10.

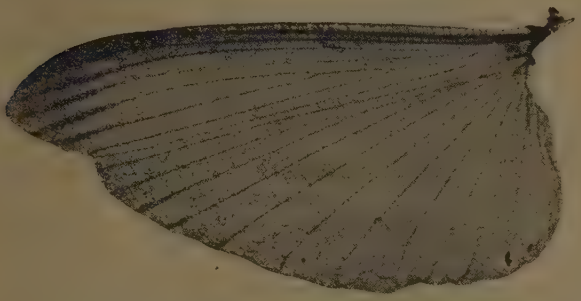


Fig. 13.—*Empusa egena*. Male. Hind wing prepared in Canada balsam. × 3 Length :—33 mm., Width:—15mm., Area:—377 sq. mm.

I am indebted to J. d'Aleman for the calculation of the increase of area.

In most Orthoptera, e. g. *Decticus verrucivorus*, *Schistocerca peregrina* and *Caloptenus spretus* (1), the wing stumps lengthen perceptibly and gradually at each moult, but in the case of Mantidae the wing stumps

1. See Brongniart 1893, Riley and Packard 1878, Adair in "Report on the Great Invasion of Locusts in Egypt in 1915", 1916.

only grow imperceptibly during the larval period. Thus it is in a very short time after the moult that the unfolding takes place. The grey grasshopper, *Pachytylus cinerascens*, is another case in point. (Fabre, Souv. Ent. VI p. 293, 4th ed. and Mœurs des Insectes, p. 248). Mantidae and some Acridiidae are in this respect comparable to Lepidoptera, Libellulidae, and Cicadidae.

The wing rudiments of Lepidoptera differ from those of Mantidae in that, during the larval period, they are placed internally under the skin of the caterpillar. (See Gonin, 1894). After the last larval moult, the four winglets appear externally in the nymph stage and like the legs and antennae are pressed along the body from front to rear. The pressure exerted by the edges of the slit in the cast skin, which slit is naturally narrow, obliges the various appendages to stretch themselves out. A liquid secreted by the skin of the nymph forms in drying a hard covering, (the chrysalis), which covers the appendages and moulding itself on them shows their exact shape. This prevents ths growth of the rudiments of the appendages. It is true that the wing stumps continue to increase their area owing to the folding peculiar to them, but their length does not alter. It is therefore at the time of the imaginal moult — rupture of the chrysalis —, as in the case of Empusa, that the unfolding takes place in a single operation.

V. The Circulation of the Blood Observed in the Wing Nervures During their Unfolding.

On May 31st. 1918, I placed under the microscope a male *Empusa* which having finished to moult, was

beginning to spread out its wings, (stage corresponding to fig. 10) ; I was then able to observe the movements of the blood in the nervures. The right hind wing was placed under the objective, while the body was

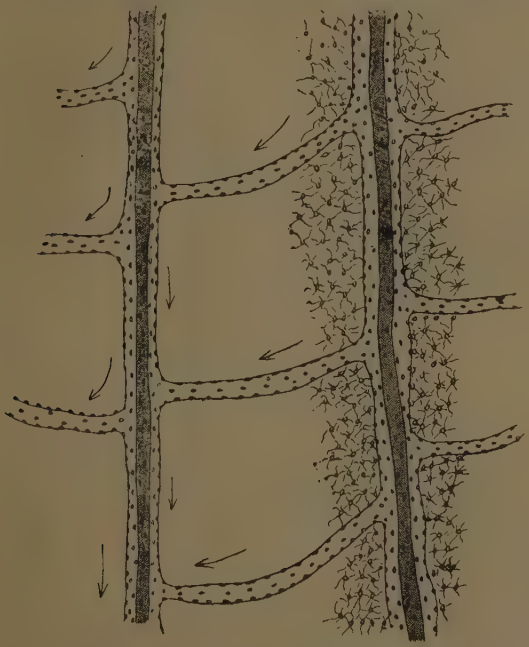


FIG. 14.—*Empusa egena*. Male. Part of hind wing. Surface aspect. × 56. The peritracheal circulation seen in a living specimen during the unfolding of the wing.

kept fast against the stage by the fingers of the left hand. The magnification was 58.

I was able to see that each nervure contains a clearly defined channel, with continuous sides, along

which the blood passes. The principal or longitudinal nervures contain in addition an easily visible tracheal tube of uniform calibre contiguous with the dorsal layer, while the secondary or transverse nervures do not possess such a tube. (Figs. 14 and 15).

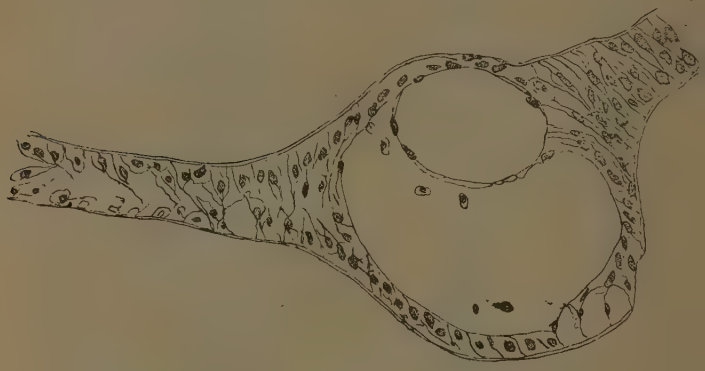


Fig. 15.—*Empusa egena*.—Hind wing fixed during the unfolding stage. Cross section through a longitudinal vein showing, above, the trachea contiguous with the upper layer of the wing; below, the peritracheal channel containiug a few blood corpuscles; and on either side cells of the interstitial tissue.

The movement of the blood can be easily followed thanks to the small nucleated cells large numbers of which float in that liquid. In the portion which I am examining these globules all flow in the same direction which is centrifugal. The whole mass of blood shows very obvious beats, about 30 to the minute, probably synchronous with the contractions of the abdomen. The movement of the globules reminds

one of the image seen in a frog's foot with this difference that the corpuscles are less numerous and move more slowly. Return currents were not observed. On the other hand I observed slight extravasations localised at a few points.

At the beginning of the unfolding process, the wings of Empusa show a basal portion, swollen and slightly diaphanous, while the apical portion is flattened. The boundary of the two regions is a sinuous line which gradually vanishes as the unfolding proceeds. This appearance can be explained thanks to extravasations. While a part of the blood circulates within the channels, that portion of the mass which has been driven out also progresses owing to the successive beats. Infiltrating the interstitial tissue between the wing layers, this portion separates the two layers and assists their unfolding.

This infiltration of the interstitial tissue is obviously only temporary. When fully unfolded the wings naturally tend to flatten. A few hours is sufficient for them to take up their final appearance.

The mechanism by which this flattening takes place has not been fully observed. It is nevertheless justifiable to suppose that the centrifugal movement is followed by a reverse flow especially along the edges. The function of this return flow would be to assist in the reabsorption of the blood.

I cannot tell whether blood circulation continues in the wings of Empusa when they are fully unfolded or whether the greater opacity of the wing merely conceals it. Experiments made on imagos several days old have given so far only negative results.

The circulation of blood in the wings of insects both newly moulted and fully developed has already been observed :

By Carus in newly emerged dragon flies, in *Ephemera lutea* and *marginata*, *Chrysopa perla*, *Lampyris italica* and *splendidula*, *Rhizotrogus solstitialis*, *Dytiscus* ;

By Ehrenberg in *Mantis* ;

By Burmeister in *Eristalis tenax* and *nemorum* ;

By Tyrrel in *Musca Domestica* ;

By Bowerbank (1837) in *Chrysopa perla*.

Quoted from Newport (1839, p. 980), and Packard (1898, p. 410).

I add to the above list the observations of Nicolet (1847) on the circulation in the elytra of the lady bird, (Coccinella), those of Moseley (1871) on the wings of the cockroach, and finally those of Fr. Brocher (1916) on the motions of the blood in the elytra and wings of *Dytiscus*.

VI. The Histology of the Wing.

The wings of insects are mere expansions or folds of the epidermis. Their hollow, flattened into a slit, is continuous with the body cavity and can receive from it tracheae, peritracheal sheaths, blood, tendon filaments, (active when the wing closes), perhaps even nerve filaments.

It is indeed as expansions of the integument that the wing rudiments appear in the Mantidae. Entirely absent at the time of hatching, these rudiments appear

during the larval period as four small prolongations of the posterior edges of the meso- and metathorax.

Thus the wing is composed of two chitinous laminae (cuticles) joined together at the edges and of two cellular layers corresponding to those laminae acting as matrices and forming the interstitial tissue. The outer laminae being impermeable in Empusa it is necessary to make a few incisions in order to allow a stain to reach the interstitial tissue.

Seen from the surface the interstitial tissue appears composed of a very large number of starred cells, reticulated by anastomosis. Although these cells are of an epithelial nature, in some ways they resemble the starred connective tissue of Vertebrates. In the neighbourhood of the veins, the chitinous laminae suddenly separated surround cylindrical channels enclosed by cells. These channels can be divided into two classes: those corresponding to principal or longitudinal veins, arranged fanwise, and those corresponding to secondary, cross or connecting veins. (Figs. 13 and 14).

The principal channels contain a trachea of uniform section (diameter 50-70 μ) without any dilatations, containing a spiral thread. This thread, sometimes difficult to see, has been identified without possibility of doubt in the wing stump shown in fig. 7.

The channel itself is a relatively wide (100-150 μ) peritracheal sheath, built of cells and along which the blood flows. This structural detail, important in our present investigation, was already observed by Newport (1839) as will be seen from the following extract quoted from Packard (1898 p. 410):

"As stated by Newport, the so-called veins or ner-

vures of the wings consist of tracheae lying in a hollow cavity, the peritracheal space being situated chiefly under and on each side of the trachea" (1).

The cross veins are distinguished from the foregoing by the absence of tracheae and serve only as passages for the blood. Directly connected with the peritracheal sheaths the cross channels must be considered as similar structures in which the trachea is atrophied. The blood corpuscles enclosed within the sheaths appear, on staining, as small oval or rounded nucleated cells.

Widely scattered in the central portion of the wing, these corpuscles congregate in large numbers in the peripheral region.

An interesting fact is that some of the cross channels are discontinuous. The vein, suddenly interrupted, opens among the cells of the interstitial tissue. This rather peculiar arrangement is probably connected with the extravasation already mentioned.

A few more details can be added by an examination of the sections; (Fig. 15). First, the interstitial tissue appears to be divided into two layers, one dorsal, the other ventral. The dorsal layer is essentially composed of cuneiform cells of which the basal portion (which contains the nucleus) adheres to the cuticle while the tapering portion projects into the interior where it usually meets with some prolongation of the other layer. The ventral layer is composed of flatter cells, ramified so as to form a kind of network.

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1. A developing wing showing, in the neighbourhood of each vein, the trachea and corresponding peritracheal cavity has been drawn by Gonin (1894) in his work on the metamorphosis of *Pieris brassicae*.

Between the two layers and in the spaces between the cuneiform cells small cavities can be seen which may be filled with plasma when the blood overflows into them during the unfolding process.

In the neighbourhood of the veins the chitinous laminae are separated. The resulting space is seen in the section as a rounded channel, clearly confined by cells and causing a prominence on one of the surfaces. If it is a longitudinal vein, a small light circle is seen close to the wall within the lumen. This corresponds to the trachea and around it the peritracheal space can be seen, much wider and transformed into a tube. The cuneiform cells, more drawn out at this point, and more closely packed, form a continuous wall to this sheath.

If on the other hand the section is across a transverse or connecting vein, it can be recognized by the absence of the trachea and the smaller diameter of the lumen. As in the preceding case, the vessel in which the blood flows has a continuous wall formed of cells. The only exceptions are the breaks observed in a few branches ; in that case the vessel terminates in a wide open end where the wall suddenly ceases.

These observations are not quite in accordance with the usual descriptions of the vascular system of insects While within the body the blood circulates in incompletely closed lacunae there is in the wings of the Empusa a network with continuous walls composed of cells. Probably similar conditions exist in the wings of Lepidoptera. Closed vessels, moreover, have been described in other parts of the body, for example in Ephemeridae, by Popovichi-Baznosanu, (1905-06).

The tracheal system of the wings of Orthoptera

arises from the two thoracic trunks which continue the longitudinal trunks of the abdomen towards the head (1). Brought closer together on entering the thorax, the longitudinal trunks give rise in the region of the meta— and mesothorax, to cross branches which can be traced as far as the veins of the wings for which they are intended. The blood which flows to the wings at the time of unfolding very probably follows the same path. The tracheae are, apparently, surrounded by lacunae, ill-defined in the thoracic region, which on entering the wings acquire walls composed of cells and continuous with those of the peritracheal system already described.

VII. The Causes of the Unfolding of the Wing.

How can we explain that the wing stumps, already formed in the larva, go through the larval stages without change, and suddenly unfold at the imaginal moult ?

There are, we think, several factors to be considered.

1. It is first necessary that the winglets should be complete. It is indeed clear that, in order to be able to unfold in less than an hour, the wing at the last moult must be already completely formed and possess its final superficies. In this connection let us quote the following experiment of Reaumur, (I, 2nd Part, 1737 p. 352). It concerns a butterfly which had just left the chrysalis. Having pulled off one of the wing stumps and stretched it with his fingers longitudinally and laterally, Reaumur saw the stump spread out and

1. The longitudinal trunks in the abdomen of *Mantidae* are peculiarly arranged, giving rise to a series of very regular lozenges.

flatten. He wrote: " The wing reached between my fingers the full size it would have acquired if it had developed in its natural position ".

It is probable that this experiment would give the same result if tried on an Empusa.

2. The second factor is the freeing of the stumps. The winglets, which until the moult had been compressed in their sheaths, are immediately after free and loose. It is owing to the withdrawal of the compressing sheath that the blood can flow into the wings. It is, however, important to note that the freedom gained at each of the larval moults produces no visible change in the appearance of the stumps or sheaths.

3. In my opinion, the new position taken up by the stumps is a third factor. Before the last moult, these organs lay along the body directed backwards, but after the moult are turned outwards, obliquely, (see figs. 3 and 4). It is possible that this change of direction facilitates the opening of the peritracheal sheaths in the neighbourhood of the blood channels into which they open.

4. Finally there are, as determinating causes, the blood pressure and the circumstances which produce it.

When observed under a lens after its complete liberation, the Empusa is seen to be subjected to regular contractions owing to which the body walls alternately close up and dilate throughout the abdomen and thorax. In the specimen under observation, these contractions occur at the rate of about 90 per minute. The wing stumps themselves are raised by rythmical beats which, incidentally, make focussing very difficult. Comparable with the inspiratory motions

of a cockchafer, the contractions of the newly moulted Empusa must drive towards the wings the blood mass accumulated in the thorax.

The supply of air enclosed within the crop must also have some influence. The crop of the Empusa, relatively larger and filling by itself the anterior half of the abdomen, is seen on dissection to be much swollen. Acting as an elastic cushion this sack swollen with air must, whenever the body walls contract, help to increase the pressure of the liquid within the abdomen.

Especially rapid pulsations of the dorsal vessel have been observed in grasshoppers at the time of moulting by Künckel d'Herculais (1884). It is highly probable that the same phenomenon occurs in Mantidae.

The meso- and metathoracic pulsatile organs in all probability also play an important part.

These were discovered by Brocher (1916) in *Dytiscus marginalis* and consist of a mesotergal pulsatile organ placed just beneath the scutellum and a metatergal pulsatile organ under the metathoracic tergite.

Each of these organs is composed of a lacuna under the integuments, and of a muscular contractile membrane enclosing this lacuna.

The membrane is convex towards the lacuna and during contraction stretches like a diaphragm and becoming flattened acts as a suction pump. Elastic fibrillae, inserted normally to the surface, bring back the membrane to its first or convex position when contraction ceases, that is during expansion.

Openings in the walls of the lacuna connect it with the vascular system of the elytra, and secondarily with the thoracic channels, on the one hand and

on the other with the aorta. Each contraction of the mesotergal organ pumps the blood flowing back from the elytra, and secondarily the blood of the thoracic channels, to drive it into the aorta while the metatergal organ acts similarly on the blood flowing back from the wings.

Brocher observed the presence of pulsatile organs, both meso- and meta- thoracic, not only in *Dytiscus* but also in the Sphingidae - in *Sphinx convolvuli* and *Macroglossa stellatarum* - then in *Cossus ligniperda*, *Decticus verrucivorus*, *Gryllus campestris*, *Tabanus bovinus*, *Tipula*, *Panorpa* and several Ephemeridae.

In the Lepidoptera, the mesotergal organ of which is remarkably large, the efferent branch joins the thoracic aorta where this vessel forms a loop turning upward towards the surface. The latest memoir of Brocher (Feb. 1919) gives on page 157, a sagittal section of the Convolvulus Hawk-moth which is most instructive on this point. The curve in the aorta of the Lepidoptera pointed out by Burgess in 1881, though previously unexplained, exists no doubt on account of this arrangement.

Janet (1906) described a pulsatile organ in the thorax of winged ants. According to Brocher, Drenkelfort (1910) and Oberlé (1913) caught sight of the thoracic pulsatile organs in one of the Ephemeridae and in *Dytiscus* respectively.

Alhough *Mantis* and *Empusa* have not yet been examined for these special organs these facts make it highly probable that Brocher's organs exist also in the Mantidae and play a very important part in the unfolding of the wings.

Fabre foresaw and even stated the action of the blood in his study of the Grasshopper. This able observer wrote (1879, VI, p. 293, and 1917, p. 257): "To unfold these poor bundles, it is sufficient that the organism should act here as a force pump and drive into the channels previously prepared a flood of humours kept in reserve for this moment which is the most laborious of all. With this system of channels ready beforehand, a fine injection explains the spreading."

Fabre would certainly have actually seen the irculation in the alar system if, instead of cutting off a wing, he had placed under the microscope a wing still joined to the living body.

Jousset de Bellesme (1877) showed that the nymph of *Libellula depressa* begins by storing air in the digestive tube (1). This becoming swollen pushes back the other organs against the integument. Under this strong pressure the blood is driven with force towards the

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1. We have observed the storing of air in the digestive tube of the locust, *Schistocerca peregrina*, and of several Egyptian species of *Mantidae* previous to the moults. The more or less prolonged period during which insects abstain from food before moulting gives them the opportunity of filling the digestive tube with air. If the head of a locust about to moult is pulled off, the alimentary canal easily follows and is seen to be very much distended with the stored air. It sometimes happens that the pressure exerted by the blood in the cervical region bursts not only the skin about to be cast but also the newly formed integument beneath. In this case, which is not of frequent occurrence, the insect invariably dies without being able to complete its moult. The following is translated from Hennegy, 1904 p.p. 500 to 502;— "Künckel d'Herculais (1890) has shown that

periphery, bursts open the nymphal envelope, expands the eyes then, penetrating the wings, causes them to unfold. (After HENNEGUY, 1904, p. 534).

In the case of the Lepidoptera, the action of blood pressure in the spreading of the wings was already pointed out by SWAMMERDAM (1668), REAUMUR (1737,1, 2nd Part, p. 354) and, among modern investigators, by PANCRITIUS (1884) and GONIN (1894).

It is thus seen that these facts are generally true. The manner of spreading the wings observed in *Empusa* must without doubt be the same in the case of the Libellulidae, the Lepidoptera, the Cicadidae, in all insects whose wings, much folded and crumpled, spread in a short time.

Among the Coleoptera, of which the elytra and wings develop gradually, the action of the blood

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the cervical sac, the function of which during the hatching of Acridiid larvae he has determined, also takes part in the moulting process. At each moult, the membrane which joins the head to the prothorax on the dorsal side, is able to swell by filling with blood; it then exerts on the dorsal integuments a strong pressure which ruptures them. This swelling of the cervical sac is produced in the same manner as the lengthening of the abdomen at the time of laying; the animal fills its crop with air till it is stretched completely: muscular contractions, even very slight, are then sufficient to drive the blood easily into the cervical sac. The pressure exerted by the latter is greater in proportion to the amount of air crammed into the crop. At the time of moulting, the tracheae contain very little air, the sacs are flattened and empty, thus the tracheal system takes no part in the moulting process". As the lining of the tracheae is shed at each moult, it is otherwise obvious that they cannot take any active part in the process. (Translator).

pressure is naturally less obvious. Laid along the sides, the wing stumps gradually lengthen during the nymphal period by cell proliferation. At the time of the last moult, there is very little unfolding. As the vascular system is generally obliterated in the imago, the veins of the hind wings tend to become mere rigid rods acting as supports. Nevertheless the observations of NICOLET on *Coccinella* (1847) and of BROCHER on *Dytiscus* (1916) show that the vascular system may persist in the elytra.

VIII. Accidents Observed During Moulting.

The imaginal moult is a critical time, a difficult stage in the life history of *Empusa*. During my breeding experiments, I have frequently observed specimens which, instead of completing their moult normally, stopped half way. The wings had been unable to unfold completely and all four showed an uneven and lumpy surface with folded and crumpled edges. Abnormally separated, they left half the abdomen exposed. Among others, I remember two females, which moulted in June 1917 and showed this peculiarity. Not having been fertilized, they were able to live two months.

A more serious accident occurs when the insect, having freed the thorax and the head, is unable to liberate the appendages. In spite of all efforts, the legs, mouth parts and antennae remain fixed within their sheaths. Particularly is this the case for the male as the freeing of the antennae with their double pectinations is always a difficult operation (Fig. 16). The breeder then has an inspiration. With the help of a fine pair f forceps he attempts to withdraw the parts from the

FIG. 16.—New.—*Empusa egena*. Male. The insect has been unable to free the head. Note the arched thorax. Owing to the delay it has become permanently arched so that, even if the head were eventually freed, the insect would be permanently crippled and unable to live.

enclosing sheaths. But our fingers are too clumsy and our tools too coarse to deal with so delicate a creature and the specimens liberated in this manner are nearly always cripples.

Further, observation shows that, in order to moult successfully the Empusa has only a short time at its disposal namely that during which the new cuticle is still malleable. As FABRE has shown, it is owing to this condition that the spines of the femora and tibiae can be depressed at the right time. After that, in spite of all attempts, the legs remain caught within the sheaths.

As to the causes of failure, the first to be noted is the debility resulting from breeding in captivity. Whether its favourite food is missing or whether, being deprived of the morning dew, it cannot drink sufficiently, a specimen bred in a cage is nearly always weak. It is in vain that, under these circumstances the Insect tries to retard its moult as long as possible (1). Denutrition continues and, as a consequence, atony of the muscles, diminution of the blood, lowering of pressure, perhaps abnormal drying of the epidermis (2).

When the critical moment arrives, the Empusa tries hard to moult, but, doomed before hand, at best produces a cripple.

Another cause of failure is the mutilation of one of

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1. Two larvae of *Empusa* taken to Paris on June 1st. 1916 and fed only on house flies postponed their moult till September. Both died after failing to free themselves.

2. Certain facts observed in Lepidoptera allow one to suppose that in the case of other insects equally, a liquid destined to facilitate moulting is secreted between the old and the new cuticle.

the legs. An Empusa which during a fight has lost one of its fore tibiae is from that date in danger of missing its stroke and has, therefore, more difficulty in feeding itself. In this case also its fate is little to be envied. It is a slow wasting away, failure to moult properly and usually death.

IX. Peritracheal Circulation. Blanchard's Theory.

Apart from its importance in the unfolding of the wings, the circulation observed in the veins is of more general interest. Let us recapitulate the observed facts in a few words. Each longitudinal nervure contains a narrow canal, the *trachea* and another much wider channel, the *peritracheal sheath*, in which the blood flows. Although the transverse nervures do not contain tracheae, they must be considered as prolongations of the peritracheal sheath.

The intrathoracic lacunae, in which the blood pressure is increased, probably open into the wing system so as to exert a thrust internally. The meso- and metathoracic pulsating organs on the other hand exert a suction which brings the blood back to the aorta from the wing system. It is towards the end of the imaginal moult that the blood thrust – suddenly increased owing to the contractions of the body and also to the forced activity of the dorsal vessel and the pulsating organs – acts on the wings and in full view of the observer brings about their unfolding.

These data lead us to make a comparison between the anatomical facts observed in the Empusa and the *theory af peritracheal circulation* brought forward for

insects in general by Emile Blanchard (Ann. Sci. Nat. (3), IX ; 1848).

This learned student writes (loc. cit. p. 382) : —" In all insects there is a dorsal vessel with a cardiac and an aortal portion. This vessel is the centre of the circulation. The cardiac portion is divided into compartments or chambers, variable in number in different types. These chambers are provided with lateral openings for the return of the blood. The aortal portion is destined to carry the nourishing fluid towards the fore part of the body. The blood having thus reached the head spreads into all the interorganic spaces ; at the same time it runs into the lacunae placed near the origin of the respiratory tubes and thus penetrates between the tracheal membranes kept open at the base by a spiral thread. The nourishing liquid, carried in this manner to all the organs between the two tunics of which the respiratory tubes are composed, is separated from the air column by but a single membrane; it is reoxygenated during its actual passage. Thus the tracheae in their periphery become real nutritive channels. The blood flowing back into the inter-fibrillary spaces is brought back to the dorsal vessel, by vessels formed of cellular tissue but without membranous walls." And on page 381 ;—"The tracheae in reality appear to us as vessels carrying air and enclosed in blood vessels ".

As is well known this theory was received with hostility. Joly of Toulouse and Léon Dufour among others (1849), opposed it strongly.

I think that Blanchard, deceived by certain appearances of his Prussian blue injections, exagerated somewhat the bearing of his doctrine. It is also possible to

point out that his description of the tracheal wall is not correct. It is not between the true membrane and the *intima* but in the outer sheath that the blood is seen to flow. Nevertheless one fact remains. In insects generally the tracheal sheaths are so made that they can, in some parts of the body, allow blood to enter and, under certain circumstances, be used for the circulation of this liquid.

Even if using the imperfect methods of his day BLANCHARD made some mistakes, at any rate he had an inkling of the phenomena we have described.

For me personnally who as a young student in 1869 learnt to dissect Insects in the laboratory of the "Muséum", then under BLANCHARD, there is much real pleasure in seeing 50 years later the theory of the peritracheal circulation of the blood partly rehabilitated and confirmed. (1),

La Luciole, Aix en Provence. June 1919.

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1. LOWNE (1893-95) p. 367 speaking of the relations between the tracheae and the blood sinuses says:—"The air-sacs may be described, therefore, as being surrounded by narrow blood-sinuses. In this sense there is a true peritracheal circulation... The larger cylindrical trunks also lie in the walls of blood-sinuses..... Blanchard's theory of an intra-tracheal circulation was the result of a misconception as to the structure of the tracheae, and is, of course, not possible, but in the sense explained above the circulation is essentially peritracheal.»

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Séance du 21 Décembre 1920

Présidence de M. le Dr. Bronislaw Debski

Nominations :

Sont nommés membres honoraires: M. le Dr Joseph Villeneuve, de Rambouillet, France, et M. André Tonnoir, de Bruxelles, sur la proposition de M. F. C. Willcocks et de M. Anastase Alfieri; M. le prof. Mario Bezzi, de Turin, sur la proposition de M. le Dr A. Mochi et de M. Hassan Efflatoun.

Ces trois nouveaux membres honoraires, que la Société s'honore d'avoir admis, se sont spécialisés dans l'étude des Diptères.

Communications

Note sur le Ver à Soie du Ricin, *Attacus ricini*, Boisd.

par E. W. Adair

Cette espèce est cultivée dans l'Assam et est tellement proche de *l'Attacus Cynthia* Dr. originaire de l'Assam et de la Chine qu'il est fort probable que l'espèce domestique n'est qu'une variété de l'espèce sauvage.

L'élevage se fait de la même manière que celui du ver du mûrier, sauf qu'il n'est pas nécessaire d'employer des filets et que, le ver étant beaucoup plus grand, il

faut plus de place. L'extrémité supérieure du cocon est ouverte, ce qui permet au papillon de sortir sans endommager la soie. On ne dévide pas la soie car le fil n'est pas continu ; les cocons sont retournés, puis bouillis avec de la potasse et ensuite filés comme du coton ou de la laine.

On peut se servir de plusieurs plantes pour l'élevage, mais la nourriture préférée est la feuille du ricin. L'Egypte serait un pays tout indiqué pour l'élevage de ce ver mais il faut toujours se rappeler que la sériculture est une question économique plutôt que biologique et avant de pousser le fellah dans cette voie, il faut s'assurer que le travail sera rémunérateur, qu'il n'entraînera pas de grandes dépenses, qu'on pourra facilement disposer de la récolte et surtout que le temps et la main-d'œuvre nécessaires ne pourraient être employés plus avantageusement. Le marché Européen est trop variable pour qu'on puisse baser cette industrie sur l'exportation des cocons, il faudrait par conséquent la considérer comme une petite industrie locale et la seule partie de l'Egypte qui semble réunir toutes les conditions voulues est la Nubie Septentrionale d'Aswan à Wadi Halfa. En effet cette région très pauvre cultive de grandes quantités de ricin et les femmes et les enfants des barbarins qui travaillent au Caire et autre part comme domestiques auraient tout le temps d'élever les vers et de filer la soie.

Nos expériences se sont limitées à de petits élevages, d'abord chez nous et ensuite au réservoir à Aswan.

Nous avons pu démontrer que l'élevage peut se faire pendant toute l'année dans le Delta et pendant les mois d'hiver à Aswan. En hiver au Caire les vers se développent très lentement et le froid exceptionnel du mois de Février

dernier à tué tous nos œufs ou à empêché la copulation efficace de sorte que les femelles auraient pondu des œufs non fécondés, mais ce contretemps aurait pu être évité en mettant les insectes dans une chambre chaude. Si jamais cette industrie s'établit en Egypte il faudrait faire de grands élevages en Nubie pendant l'hiver et de petits élevages en été au Caire pour fournir la graine de l'hiver suivant, car il n'y a pas moyen de garder cette graine d'une année à l'autre comme on le fait pour celle du ver du mûrier.

Plusieurs essais ont été faits avant que nous réussissions à obtenir des vers. Il fallait les faire venir des Indes et comme les vers éclosent après une période variant de 7 à 20 jours selon la température, il est impossible de faire venir la graine; on envoie des cocons dans des boîtes assez grandes pour que les papillons puissent éclore et s'accoupler en route. Les changements de climat surtout pendant la traversée de la Mer Rouge ont presque toujours tué les chrysalides ou hâté l'éclosion des vers et ce n'est qu'en Décembre 1917 que nous avons reçu des œufs pondus en route et non éclos. Depuis lors nous avons reçu deux autres envois en bon état.

Nous préparons un rapport détaillé sur nos élevages de l'année 1918 et nous nous contenterons ici de donner le résumé de nos observations dans les tableaux qui suivent.

TABLEAU N° 1

Moyennes du nombre de jours nécessaires au développement dans les circonstances variables de saison et de localité.

** Oeufs pondus en voyage. Au Caire la période aurait été plus longue.*

Numéro d'ordre	LOCALITÉ	DATE DE LA PONTE	Développement Total	Oeuf	Larve	Cocon
1	Caire	Fin Novembre 1917	140	10*	82	48
2	»	Fin Février 1918	87	20	41	26
3	»	Mi Avril 1918	64	13	29	22
4	»	Fin Mai à Fin Septembre	52	8	22	22
5	Caire puis Aswan	Mi Novembre 1918	87	13	43	31
6	Aswan	Mi Février 1919	58	12	27	19
7	»	Commencement Mars 1919	50	10	20	20

TABLEAU N° 2

Les poids sont en grammes.

Le «1» et le «3» appartiennent à une mauvaise série.

Pour les autres nous ne donnons que la moyenne des meilleurs élevages.

NUMÉRO D'ORDRE	POIDS DE 100 COCONS RETOURNÉS	NOMBRE DE COCONS PAR KILO
1	25	4000
2	39	2544
3	28	3543
4	48	2088
5	50	2000
6	45	2222

Election du Bureau pour l'année 1921

Sont nommés Président: M. le Major Stanley Smith Flower; Vice-Président: M. Ernest W. Adair; Secrétaire-Général: M. le Dr. Walter Innes Bey; Secrétaire-Adjoint: M. Anastase Alfieri; Trésorier-Bibliothécaire: M. Richard Wilkinson.

EXPLANATION OF PLATE I.

FIG. 1. Larva, dorsal view.

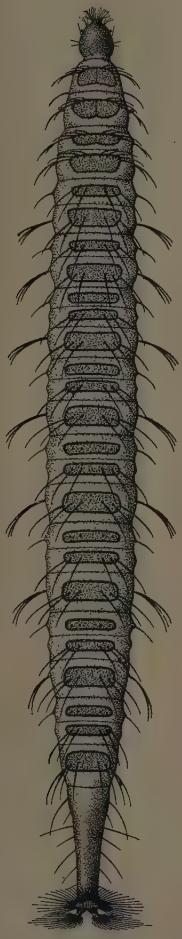
FIG. 2. Larva, ventral view.

FIG. 3. Larva, mouth-parts:
L = labrum; MB = mandible;
HYP = hypopharynx; A = antenna;
MX = maxilla; SM = submentum;
SD = salivary duct; E = eye.

FIG. 4. Larva, anus and ventral plates.

FIG. 5. Larva, dorsal view of extremity of eighth abdominal segment showing the four processes and the two posterior spiracles.

PLATE I



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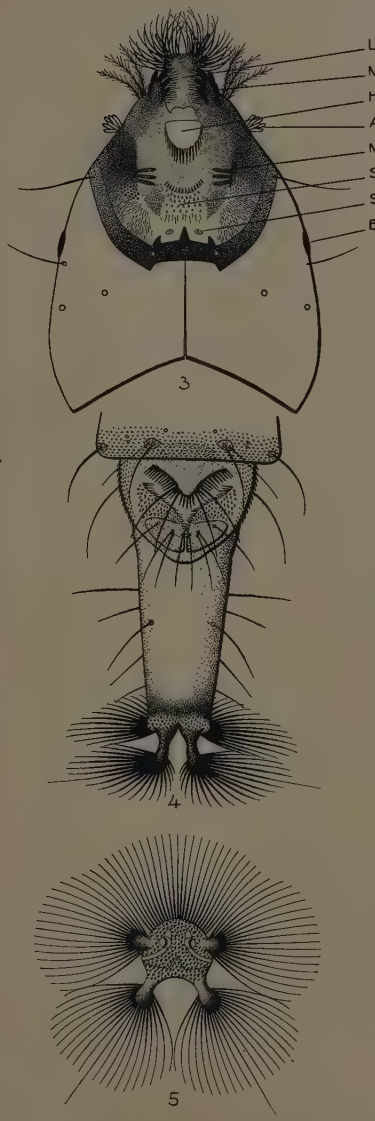

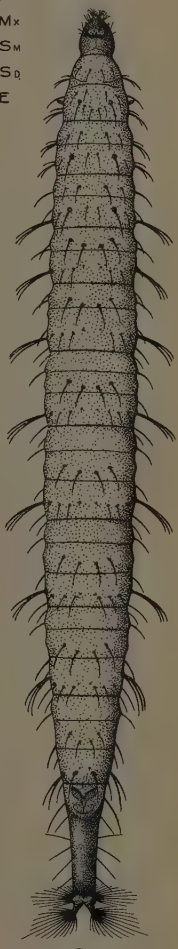

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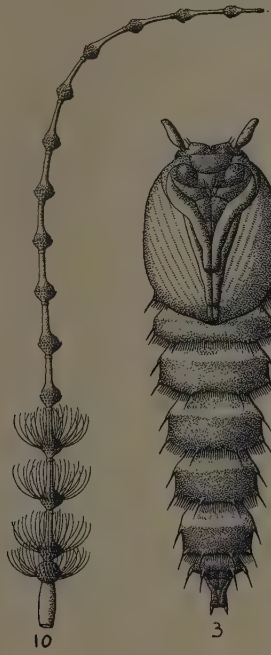
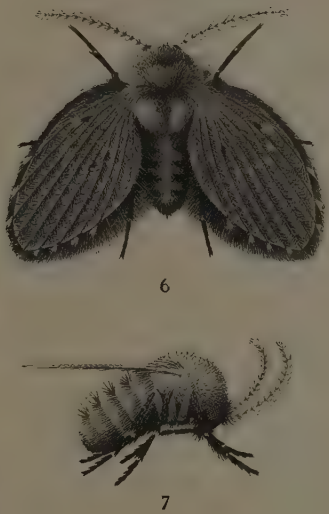
PLATE II.

EXPLANATION OF PLATE II.

FIG. 1. Egg, a few hours after being laid.
FIG. 2. Egg, before hatching.
FIG. 3. Pupa, ventral view.
FIG. 4. Pupa, respiratory appendage.
FIG. 5. Pupa, posterior end, lateral view.
FIG. 6. Adult fly, at rest, dorsal view.
FIG. 7. Adult fly, at rest, lateral view.
FIG. 8 & 9. Adult fly, natural size.
FIG. 10. Adult, antenna.

PLATE II





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BULLETIN

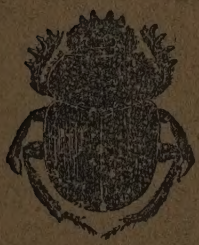
DE LA

SOCIÉTÉ ENTOMOLOGIQUE

D'ÉGYPTE

FONDÉE LE 1er AOUT 1907

Fatti non foste a viver come bruti,
Ma per seguir virtude e conoscenza
DANTE



Sa Hautesse le Sultan Fouad Ier a daigné prendre la Société sous son Haut Patronage

Année 1920

XIII (1920), 1921

LE CAIRE
IMPRIMERIE PAUL BARBEY
1921

La Société Entomologique d'Égypte tient ses séances le premier mercredi de chaque mois (excepté Juillet, Août et Septembre) à 6 heures p.m., dans la Salle de l'Institut d'Egypte.

Elle a déjà publié :

Bulletins	1908	4 fascicules	Prix P.T. 10 le fascicule
»	1909	4 »	
»	1910	4 »	
»	1911	4 »	
»	1912	4 »	
»	1913	4 »	
»	1914-15	1 fascicule	Prix P.T. 40
»	1916	4 fascicules	Prix P.T. 10 le fascicule
»	1917	4 fascicules	Prix P.T. 10 »
»	1918	1 fascicule	Prix P.T. 20
»	1918	2 fascicules	Prix P.T. 10 le fascicule
»	1919	1 fascicule	Prix P.T. 40
»	1920	1 fascicule	Prix P.T. 40

Mémoires Vol. 1 — fasc. 1 — Révision des *Chrysidides* de l'Egypte, par Robert du Buysson, 1908.
Prix P.T. 80

fasc. 2 — Révision des *Mutillides* de l'Egypte, par Ernest André, 1910.
Prix P.T. 80

fasc. 3 — Révision des Orthoptères de l'Egypte, 1re partie : *Forficulides, Blattides, Mantides*, par le Dr W. Innes Bey, 1912.
Prix P.T. 80

fasc. 4 — Liste des Cécidies signalées en Egypte jusqu'à ce jour, par le Dr Bronislaw Dçbski, 1918.
Prix P.T. 40.

Les **Bulletins** et les fascicules des **Mémoires** de la **Société** sont en vente chez M. le Bibliothécaire de la Société. — Boîte Postale N° 430.— Le Caire.

Pour la correspondance scientifique, réclamations et changement d'adresse, s'adresser à **M. le Secrétaire Général de la Société Entomologique d'Égypte.**
Boîte Postale N° 430. — Le Caire.

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